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<p>This report lists all unclassified technical reports which have been published during the period from May 1973, when the Navy Personnel Research and Development Center was created, to the end of June 1976. Reports are listed under six major functional areas: Personnel Acquisition and Initial Assignment, Career and Occupational Design, Human Performance in Navy Systems, Personnel Education and Training, Personnel Management, and Factors in Personnel Effectiveness.</p>		

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SUMMARY

This report lists all unclassified technical reports which have been published in the period from May 1973, when the Navy Personnel Research and Development Center was created, to the end of June 1976.

Reports are listed under the following six major functional areas:

1. Personnel Acquisition and Initial Assignment. Development and application of tests and procedures for recruiting and selecting promising officer and enlisted personnel, assessing their aptitudes and abilities, and assigning them to initial service positions.
2. Career and Occupational Design. Use of techniques for structuring career advancement paths within various occupational areas, providing for career monitoring, guidance and counseling, and evaluating the adequacy of various career progression systems.
3. Human Performance in Navy Systems. Development of techniques and methods for measuring human performance in Navy systems under various conditions and the application of those methods to assess personnel proficiency levels, and to quantify human capabilities and limitations. Includes consideration of human factors in the design of equipment.
4. Personnel Education and Training. Development of instructional technologies and procedures and their application according to human learning principles to develop required skills, knowledges, and abilities in naval personnel. Includes test and evaluation of training concepts, methods and programs.
5. Personnel Management. Development, application, and test of models and techniques for dealing with human resource factors in manpower and personnel system planning and management.
6. Factors in Personnel Effectiveness. Development of methods for solving attitude and motivational problems and for determining how contemporary social trends and organizational factors affect operational capabilities.

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PERSONNEL ACQUISITION AND INITIAL ASSIGNMENT

A Method for Evaluating Alternative Recruiting-Selection Strategies: The CAPER Model. TR 74-3, September 1973. William A. Sands. DDC Availability Number AD-770 390.

Managers of personnel systems justifiably demand an estimate of the payoff, in dollars, which can be expected to result from the implementation of a proposed selection program. The Cost of Attaining Personnel Requirements (CAPER) model determines an optimal recruiting-selection strategy. Specifically, the CAPER model provides the personnel manager with the information necessary to minimize the estimated total cost of recruiting, selecting, inducting, and training a sufficient number of persons to meet a specified quota of satisfactory personnel. This article describes the CAPER model and illustrates the application of the model to a personnel recruiting-selection problem. The advantages and limitations of the model are discussed.

Occupational Scales of the Navy Vocational Interest Inventory: I. Development. TR 74-4, October 1973. Joyce E. Dann and Norman M. Abrahams. DDC Availability Number AD-770 558.

Each year, thousands of enlisted recruits enter the Navy and, with little or no Navy experience, must indicate the ratings they would like to pursue for most of their military careers. The Navy Vocational Interest Inventory (NVII) was constructed to help these recruits determine the ratings which correspond most closely with their vocational preferences and in which they would probably be most satisfied.

The present report describes the development of 15 occupational scales for the NVII which yield scores based upon a modification of the point-biserial correlation and reflect the extent to which an individual's interests resemble the interests of satisfied men in 15 different Navy ratings.

Intercorrelations among the scales were determined and were generally higher than those for the Strong Vocational Interest Blank or the Kuder Occupational Interest Survey. The median intra-individual standard error of measurement was .027. Based upon this median, a one per cent confidence interval, and a two-tailed t test, a difference of .07 or more between two scores, can be considered a true difference.

PERSONNEL ACQUISITION AND INITIAL ASSIGNMENT (Continued)

Correlations between scores based on part and those based on all of the NVII items were also calculated and indicate that usable scores can be derived from incomplete answer sheets.

Various techniques designed to detect improperly completed answer sheets were tried, with the magnitude of an individual's highest score on the 15 occupational scales providing most efficient discrimination of the techniques evaluated.

Occupational Scales of the Navy Vocational Interest Inventory: II. Reliability. TR 74-5, October 1973. Joyce E. Dann and Norman M. Abrahams. DDC Availability Number AD-770 557.

Each year thousands of enlisted recruits enter the Navy and, with little or no Navy experience, must indicate the ratings they would like to pursue for most of their military careers. The Navy Vocational Interest Inventory (NVII) was developed to help these recruits determine the ratings corresponding most closely with their vocational preferences and in which they would probably be most satisfied.

Recently, 15 occupational scales were constructed for the NVII to reflect the degree of relationship between an individual's interests and the interests of men in 15 specific Navy ratings. The scales yield scores known as lambda coefficients, which are based upon a modification of the point-biserial correlation between the individual's NVII responses and responses of men in each of the 15 ratings.

The present study evaluated the test-retest reliability of profiles of scores based upon these lambda scales for 179 reenlistees and 136 nonreenlistees. The men were first tested in 1964 or 1965 prior to entering one of seven class "A" schools and were retested four to six years later. Information on the scales' internal consistency reliability was also obtained using a representative sample of Navy recruits.

Median test-retest correlations, where Spearman's rank-difference method was used to compute the relationship between the ranks of scores on each individual's test and retest profiles, were .87 for reenlistees and .85 for nonreenlistees. The median internal consistency reliability for the 15 scales was .96.

Based on these results, lambda scales of the NVII are considered sufficiently stable for use in recruit classification.

PERSONNEL ACQUISITION AND INITIAL ASSIGNMENT (Continued)

However, the scales' ability to differentiate between individuals in different ratings and to predict such criteria as job satisfaction must be evaluated using currently available data before the scales can be recommended for operational use.

Evaluation of Occupational Choices in the Marine Corps. TR 74-7, September 1973. Arthur C. F. Gilbert and Ted M. I. Yellen. DDC Availability Number AD-773 349.

The purpose of this study was to determine the occupational preferences of Marine recruits with regard to occupational fields other than those in aviation. The Marine Assignment Preference Schedule (MAPS), which includes 28 military occupational fields, was administered in May 1972 to approximately 850 Marine recruits at the Marine Corps Recruit Depot, Parris Island, who were in their third week of training. Analysis showed that the five most preferred military occupational fields as indicated by the recruits first choice were Motor Transport; Military Police; Construction, Equipment and Shore Party; Utilities; and Infantry.

Noncognitive Factors as Predictors of Individual Suitability for Service in the U. S. Navy. TR 74-13, April 1974. Samuel E. Bowser. DDC Availability Number AD-780 438.

This study is a pilot utilizing noncognitive data sources in the prediction of individual suitability for service in the U. S. Navy. A methodology was developed which enables a logical selection of subsets of categorical predictors to optimize the prediction of suitability for service. The results support the contention that noncognitive data sources are important and useful in prediction of success in the U. S. Navy.

Electronics Technician Direct Procurement Petty Officer (DPPO) Pilot Program: Phase I. TR 74-20, March 1974. Lloyd S. Standlee, Chester R. Bilinski and John C. Saylor. DDC Availability Number AD-778 029.

Direct Procurement Petty Officer (DPPO) program trainees, who were recruited after they had acquired technical training in civilian schools (associate or comparable degree in electronics), were compared with regular "A" School trainees in terms of academic performance, job performance, and cost of training. The academic performance data were

PERSONNEL ACQUISITION AND INITIAL ASSIGNMENT (Continued)

obtained from records of the Electronics Technician Shipboard Indoc-trination (Communications/Radar) School, Great Lakes and Treasure Is-land. The job performance data were obtained by means of a question-naire mailed to the fleet. Cost data were based upon weeks of train-ing saved and pay grade differences in the pilot and control groups.

The DPPO trainees were judged by their immediate supervisors in the fleet to be slightly better than regular trainees in terms of length of time required to learn their job and probable advancement in the Navy. The regular trainees were rated slightly better than the DPPO trainees in ability to use schematics and wiring diagrams. The regular trainees also received slightly higher average written test scores at Treasure Island. These differences tend to lose their sig-nificance, though, in view of the 21 comparisons wherein there was no statistically significant difference in the performance of DPPO and regular trainees. The cost to the Navy of DPPO trainees was lower than that of regular trainees.

An Evaluation of Computerized Tests as Predictors of Job Performance in Three Navy Ratings: I. Development of the Instruments. TR 75-2, August 1974.
Charles H. Cory. DDC Availability Number AD-782 527.

The potential usefulness of computerized tests for supplementing paper-and-pencil measures for predicting job performance abilities was the objective of a series of studies. This report covers the initial test development and analysis research.

Eight computerized tests were constructed to measure five personal attributes identified in previous research as being important for job performance. The experimental battery also contained nine previously developed tests. The battery was administered to 385 enlisted personnel and test results and interrelationships were analyzed in conjunction with operational written test and biographical variables. Correlational and factor analyses were carried out.

Computerized tests were particularly important for measuring sequen-tial information processing, movement detection, and short-term memory skills. They offered no advantage over paper-and-pencil measures of perceptual speed, and findings relative to perceptual closure were am-biguous.

Computerized and paper-and-pencil tests of perceptual closure apparently measured different abilities.

The two separate, short-term memory abilities found corresponded to faculties for high associational and low associational (rote) stimuli.

PERSONNEL ACQUISITION AND INITIAL ASSIGNMENT (Continued)

A Comparison of the Influence of Instructional Set on Test Results for Mental Level and Racial Groups. TR 75-5, October 1974. Charles H. Cory. DDC Availability Number AD-787 619.

The purpose of this study was to investigate whether differences in motivational conditions associated with test administration affect individual performance. Previous research has shown that conditions of administration can influence group performance on written tests.

Results from an experimental battery administered under four different instructional conditions were compared for Category IV, non-IV, Black, and non-Black subgroups. Lack of motivating instructions significantly lowered the test performance of Category IV personnel on the most cognitive experimental tests, but did not affect the performance of IVs, non-IVs, Blacks or non-Blacks on more noncognitive tests.

The Unobtrusive Measurement of Racial Bias Among Recruit Classification Specialists. TR 75-6, October 1974. David C. Atwater, Edward F. Alf, Jr. and Norman M. Abrahams. DDC Availability Number AD-A000 065.

Unobtrusively gathered historical data documenting decisions made in the Navy's recruit classification process were utilized to determine whether there were significant differences between black and white classification interviewers in their treatment of black and white recruits. The nature of the classification procedure resulted in the essentially random assignment of black and white recruits to black and white classifiers. This permits a number of interesting comparisons and obviates numerous problems inherent in racial bias studies.

The major hypothesis that black and white classifiers would be differentially biased in their treatment of black and white recruits was not supported. A second hypothesis that classifiers within either racial group would be differentially biased in their treatment of black and white recruits also was not supported.

Sample sizes were so large that classifier bias accounting for as little as one percent of the criterion variance would have been detected as significant. Thus, there was neither statistically nor practically significant bias detected among classification specialists.

PERSONNEL ACQUISITION AND INITIAL ASSIGNMENT (Continued)

Identification of Naval Academy Applicants With Engineering and Science Interests. TR 75-7, October 1974. Idell Neumann and Norman M. Abrahams. DDC Availability Number AD-787 062.

Due to the Navy's increasing manpower needs for high quality officers with engineering and science training, it has become necessary for the Naval Academy to increase the numbers of midshipmen electing engineering and science majors.

To obtain the necessary increased numbers of midshipmen electing engineering and science majors and avoid the mandatory placement of midshipmen in these programs, it was planned to investigate the use of an interest inventory to aid in selecting those Naval Academy applicants with a high likelihood of choosing an engineering or science major.

The Strong Vocational Interest Blank (SVIB) was selected for empirical scale construction. A dichotomous criterion based on midshipmen major selections, i.e., engineering-science vs. "other" majors, was used to construct a scale (E-S(1)), utilizing the SVIB responses of half the 1973 graduating class. This scale was cross-validated on the remaining 1973 graduates, as well as the 1976 and 1977 classes. The class of 1976 was also used to investigate the relationship between the E-S(1) Scale and disenrollment at the Academy. Scale test-retest stability with the additional factor of two administrative sets, selection and experimental, was determined for a subsample of the 1977 class.

Cross-validated biserial correlations of .57, .62, and .63 were obtained for the 1973, 1976, and 1977 classes, indicating a high degree of statistical and practical significance for the E-S(1) Scale for differentiating between midshipmen selecting engineering-science rather than an "other" major. Test-retest correlations of .80 and .81 were computed for two subsamples of the 1977 class based on pre- and post-selection SVIB administrations. A linear progression was observed between E-S(1) Scale scores and disenrollment rates for the 1976 class. The highest scoring group (upper fifth) showed a 20 percent disenrollment and the lowest scoring (bottom fifth) group experienced a 35 percent disenrollment rate.

The Engineering-Science Scale is highly recommended for use by the Naval Academy to make selection decisions in those cases where candidates are otherwise equally qualified on other selectors such as Scholastic Aptitude Test (SAT) scores, high school rank, etc.

Prior to incorporating the Engineering-Science Scale into the selection composite where a candidate's score would enter into virtually all decisions, its effect on other predictors and criteria should be determined for various cut-off scores on the E-S(1) Scale.

PERSONNEL ACQUISITION AND INITIAL ASSIGNMENT (Continued)

Impact of Increasing Preference Options in the Marine Corps. TR 75-12, November 1974. Aaron Katz and Bernard A. Rafacz. DDC Availability Number AD-A003 452.

The impact of increasing preference options in the Marine Corps was studied by administering the Marine Assignment Preference Schedule (MAPS) to all recruits entering the Marine Corps between October 1972 and April 1973, to whom no special training commitment had been made. Enlistees indicated their occupational preference on MAPS administered at entry to recruit training, at completion of recruit training, and 6 months after the completion of recruit training. In each case, selection was made from 28 Marine Corps ground occupational fields. The third administration of MAPS included self-evaluations on job satisfaction and service plans. Concurrently with the third MAPS administration, supervisory evaluations were obtained on job performance. Occupational preferences were found to be rather unstable (inconsistent) from one administration of MAPS to another. Statistically significant differences were observed on supervisory and/or self-evaluations between individuals in an occupational field/area they preferred versus those in the same field/area who had chosen some other field/area. The differences between groups based on preferences expressed at entry into basic training are statistically significant. However, they are so small that the association between granting preference options and job satisfaction/job performance has not been clearly demonstrated.

Three recommendations are presented for possible consideration: (1) provide a wider dissemination of information on Marine Corps occupational fields to potential recruits, (2) use occupational choice as an inducement for reenlistment, and (3) after determining a recruit's aptitude, interests, and abilities, prepare a subset of the occupational fields in which he has the most potential for his selection.

Electronics Technician Direct Procurement Petty Officer (DPPO) Pilot Program: Phase II. TR 75-37, June 1975. Lloyd S. Standlee and Chester R. Bilinski. DDC Availability Number AD-A011 051.

The effectiveness of electronics technicians who were sent to civilian technical schools for a major part of their training was compared with the effectiveness of those who had gone through the normal progression of Class "A" School training. The criteria of effectiveness were academic performance, job performance, and cost of training. Overall, there was no significant difference in the performance of civilian-trained and Navy-trained electronics technicians. Civilian training costs were lower.

PERSONNEL ACQUISITION AND INITIAL ASSIGNMENT (Continued)

Racial Differences in the Prediction of Class "A" School Grades. TR 75-39, June 1975. Patricia J. Thomas. DDC Availabilty Number AD-A012 319.

This study is the latest in a series of efforts to provide the educationally disadvantaged with an opportunity for technical training in a Navy rating. Based on the findings of a 1972 study, which concluded that the Navy's selection tests are not as valid for minority personnel as they are for the majority group, the utility of alternative test composites was investigated.

The samples were drawn from all students attending a Class "A" school during 1971-1972. Twenty-five courses had a sufficient number of black students to be included in the study. Comparisons were made between mean selection test scores, mean final school grades, and academic attrition rates of the two racial groups. Regression lines were plotted for white and black students to investigate the usefulness of lower cutting scores for minorities. Predictive validities of the current selection composites and all other combinations of Basic Test Battery (BTB) tests were determined.

Differential validity of the operational BTB selectors was reaffirmed and alternative selectors were identified. The mean test scores of blacks were significantly lower than those of whites in all 25 courses but their final school grades were not significantly lower in 6 courses. Analysis of the regression lines demonstrated that lower aptitude blacks generally would earn higher grades than lower aptitude whites.

It was concluded that an improvement in minority assignment to technical training can be accomplished by implementing new selection composites, valid for both whites and blacks. Lowering the cutting score for blacks on the current combinations of BTB tests was counterindicated due to the chance-level validities of the operational composites in these courses.

Validation of the Delinquent Behavior Inventory as a Predictor of Basic Training Attrition. TR 76-3, August 1975. Ted M. I. Yellen. DDC Availability Number AD-A015 281.

The Delinquent Behavior Inventory (DBI) was designed to identify Navy applicants likely to display delinquent behavior, including illicit drug use while in the Navy. The DBI was administered to 2,500 Navy recruits during their first week of basic training in San Diego, California. Of the 2,500 recruits, 101 were discharged for detrimental causes. Analysis shows a low positive correlation between the DBI items and basic training graduation/attrition. An analysis of the graduate/attrition item responses indicated a negative response pattern for the attritees. The attritees tended to be younger and less educated. They were more inclined not to like themselves. and

PERSONNEL ACQUISITION AND INITIAL ASSIGNMENT (Continued)

had a liberal attitude toward drugs, a negative attitude toward authority and discipline, and a general disregard for law and order. They indicated a lack of drive or motivation and exhibited antisocial behaviors. They also had a negative outlook on life.

An Evaluation of Computerized Tests as Predictors of Job Performance: II. Differential Validity for Global and Job Element Criteria. TR 76-28, January 1976. Charles H. Cory. DDC Availability Number AD-A020 867.

This report, the second of two, presents data concerning the validity of a set of experimental computerized and paper-and-pencil tests for measures of on-job performance on global and job elements. It reports on the usefulness of 30 experimental and operational variables for predicting marks on 42 job elements and on a global criterion for Electrician's Mate, Personnelman, Sonar Technician, and Apprenticeship rating groups.

About 10 percent of the zero-order validities of experimental tests were statistically significant, with most of the significant validities being for the Sonar Technician rating. Most experimental tests with significant validities were computer-administered. Experimental variables substantially enhanced the predictive accuracy of the operational battery with the most useful increments being for the Sonar Technician rating.

There was little or no evidence of consistency of the job element characteristics across ratings. The job elements which were highly predictable were those which were important and central to the duties of particular ratings. For the Technical ratings, the most effective predictors of job element marks were experimental tests, with the best such tests being computer-administered. Use of Time Required and Importance ratings as moderators for prediction of global marks from the marks for job elements did not result in any practical increase in validity coefficients. Generally, low correlations were found between empirically-derived estimates of importance of personal attributes for particular job elements and similar estimates based on the judgments of personnel experts. Synthetic validity was generally not as accurate as multiple regression for predicting job performance.

PERSONNEL ACQUISITION AND INITIAL ASSIGNMENT (Continued)

Development of Behaviorally Based Rating Scales For Evaluating the Performance of U.S. Navy Recruiters. TR 76-31, February 1976. Walter C. Borman, Leaetta M. Hough, and Marvin D. Dunnette (Personnel Decisions, Inc.). DDC Availability Number AD-A022 371.

This report describes development and field testing of job performance rating scales for the job of Navy recruiter. Over 800 critical incidents describing different facets of effective and ineffective recruiting performance were obtained from field recruiters and recruiter supervisors representing all seven recruiting areas. These incidents were classified into the following nine dimensions: (1) Locating and Contacting Qualified Prospects, (2) Gaining and Maintaining Rapport, (3) Obtaining Information from Prospects and Making Good Person-Navy Fits, (4) Salesmanship Skills, (5) Establishing and Maintaining Good Relationships in the Community, (6) Providing Knowledgeable and Accurate Information About the Navy, (7) Administrative Skills, (8) Supporting Other Recruiters and the Command, and (9) Dedication to the Job.

Recruiters who had not participated in writing the critical incidents then categorized the incidents according to the above dimensions. They also scaled each behavior incident according to the relative level of performance effectiveness portrayed by the incident. A total of 352 incidents was reliably retranslated (that is, 60 percent or more of the recruiters agreed on the category placement and scale scores showed standard deviations of 2.0 or less). Only dimension 9 (Dedication) failed to be retained for further analysis.

In addition, a different group of recruiters made similarity judgments between every possible pair of a subset of 60 behavior examples chosen randomly from a larger pool of incidents. The resulting similarity matrix was analyzed via nonmetric multidimensional scaling (MDS) to yield a five-dimension solution. Canonical analyses showed extremely high agreement between linear combinations of the nine dimensional retranslation solution and the five-dimensional MDS solution. Regression analyses were conducted to define more fully the pattern of contributions made by various combinations of the MDS dimensions to each of the retranslation dimensions.

As a refinement of the behavior scaling approach to developing rating scales, behavior examples were grouped according to retranslation results into four levels (very high, high, low, very low) on each of the eight retained performance dimensions. The behavioral content of each group of incidents was then represented by three behavior summary statements. These behavior summary statements became the descriptive anchors used to describe, for each scale, the four levels of recruiter job performance ranging from Very Low to Very High.

PERSONNEL ACQUISITION AND INITIAL ASSIGNMENT (Continued)

We chose to use these behavior summary statements in order to assure that the final performance rating scales were universally relevant across Navy recruiter positions instead of depending upon any single set of relatively narrow and behaviorally specific incidents.

The Behavior Summary Scales were field tested by using them to obtain job performance ratings for 24 recruiters from eight stations. Each recruiter's performance was rated by himself, by from one to three peers, and by either one or two supervisors. Analysis of the field test results showed that self and peer ratings contained impressive convergent and discriminant validity. Future use of these Navy Recruiter Behavior Summary Performance Scales should be restricted to self and peer ratings in order to assure highest reliabilities and most valid performance appraisals. Supervisory ratings of Overall Recruiter Performance should be used to portray the overall job effectiveness reputation of each recruiter and to provide summary information about differing levels of recruiter effectiveness across different stations.

A Comparison of the Job Performance and Attitudes of Category IVs and I-IIIs in 16 Navy Ratings. TR 76-35, May 1976. Charles H. Cory. DDC Availability Number AD-A024 642.

As an aid to the appropriate assignment of Category IV personnel to Navy ratings, this study was intended to provide objective data on the performance abilities of IVs in a representative sample of ratings.

Supervisory evaluations, biographical information, and attitude data were collected on samples of IV and non-IV personnel in 16 Navy enlisted ratings. Comparisons of IVs and non-IVs in each rating were made in terms of job performance, personal characteristics, and attitudes. t tests were used to identify the distinguishing characteristics of high performing IVs in five ratings. Multiple-regression analyses were used to investigate the predictability of performance of Category IVs in three ratings.

In the ratings covered, IVs exhibited generally widespread but small deficits in on-job performance when compared with non-IVs. Deficits in the global performance of IVs were generally statistically significant for the Boiler Technician, Machinery Repairman, and Quartermaster-Signalman ratings/rating groups. Test scores and educational attainment were associated with high on-job performance of IVs. There were few consistent differences in motivation and outlook between IVs and non-IVs.

PERSONNEL ACQUISITION AND INITIAL ASSIGNMENT (Continued)

Empirical Weighting of Predictors for the Naval Academy Selection Program.
TR 76-37, June 1976. Idell Neumann and Norman M. Abrahams. DDC Availability Number AD-A027 275.

A selection composite, the Candidate Multiple, has been used for a number of years to select midshipmen for admission to the U.S. Naval Academy. The Candidate Multiple, a consistently good predictor of academic success, is not as effective in predicting other Academy success criteria. Since composite components tend to be less valid for present classes, and new measures should be considered as additional or replacement components, the Academy requested a revision of the composite to find the optimal combination of present and experimental predictors.

Data from three Naval Academy Classes (1975-1977) were used to determine and cross validate regression weights that best predict the following criteria of success at the Academy: (1) Cumulative Quality Point Ratio (CQPR), (2) Cumulative Military Aptitude Rating (CMAR), (3) Choice of Major (MAJOR), (4) Voluntary Resignation (VR), and (5) All Attrition (ATT). Zero-order validities were computed against each of the five criteria for each of the following seven predictors: SAT-Verbal, SAT-Mathematics, High School Rank, Recommendations, Extracurricular Activities, SVIB Engineering-Science Scale, and SVIB Disenrollment Scale.

Two composites of almost equal value were developed that exceeded the prediction obtained with the current composite. A substantial increase in validity was obtained for the two criteria most in need of improvement, i.e., voluntary disenrollment and choice of major. One of these selection composites was adopted in August 1975 by the Naval Academy for selecting the Class of 1980.

Low validities found for the present Extracurricular Activities scoring weights suggest that empirical weighting of the items be investigated. The SVIB Disenrollment Scale should be revised to overcome the reduced effectiveness noted when the scale was validated against responses obtained in a preselection administration of the inventory. Subsequent monitoring and revising of the operational selection composite are recommended for maintaining its efficiency.

CAREER AND OCCUPATIONAL DESIGN

Enlisted Rotation Management: Users Guide to the Computerized Equilibrium Flow Model. TR 74-1, September 1973. Norman I. Borgen, Jerry A. Segal and Robert P. Thorpe. DDC Availability Number AD-769 679.

The planned periodic rotation of enlisted personnel between sea and shore assignments is a firmly established practice in the Navy. Managing rotation in an equitable and effective manner, however, continues to pose serious problems that are extremely difficult to resolve. Previously developed computer programs have successfully demonstrated the feasibility of generating quantitative data useful in rotation-related decisions.

The computer model described in this report provides a highly flexible management tool that can be controlled by the user through selected data on three parameter cards and an input personnel data deck at any desired level of occupational grouping. Basic output consists of equilibrium tours that would support prescribed tours for each of three selected conditions. A secondary output presents summary tables of population aggregate characteristics to aid in broad policy testing and formal action. A variety of other problems may also be dealt with by manipulation of the input parameters.

A Simple Policy Planning Model For Determining Sea and Shore Tour Lengths. TR 74-2, September 1973. Richard W. Butterworth (Naval Postgraduate School) DDC Availability Number AD-767 962.

The periodic rotation of enlisted personnel between sea duty and shore duty assignments is a firmly established Navy policy. The efficiency with which the rotation process is managed, however, can have an effect on both the personnel readiness of operating units and morale of the individual Navy man. This study is part of a larger research program to develop computerized models of the rotation process to provide rotation managers in the Bureau of Naval Personnel with a quantitative basis for decisions and the capability to test and evaluate rotation policy.

In this report a simple model for determining nominal tour lengths which would keep the sea and shore populations in balance is presented. It differs from previous models developed within the research program in that a different set of assumptions are made, and different data are required for using the model. In the conclusions, the applications and limitations of this model are discussed as well as some ideas on what future research might be done on the sea/shore rotation problem.

CAREER AND OCCUPATIONAL DESIGN (Continued)

Symposium Proceedings: Occupational Research and the Navy - Prospectus 1980.
TR 74-14, March 1974. Earl I. Jones. DDC Availability Number AD-779 000.

This report includes 22 papers assessing the state-of-the-art in Occupational Research presented in a symposium on 10-12 July 1973. Fields covered include: (1) Occupational Analysis, Structure and Methods, (2) Career Development, (3) Organizational Effectiveness, (4) Motivation to Work, and (5) Measurement and Prediction.

Apprenticeship Personnel Shipboard Work Evaluation: Statistical Analysis.
TR 74-18, March 1974. Hulett C. McDowell and Paul A. Magnusson. DDC Availability Number AD-782 333.

The total Navy effort in the development of new/improved methods and techniques for the determination of qualitative Navy Manpower requirements must keep pace with expanding needs for occupational data. Specifically, this research effort required designing of multipurpose data gathering tools and conducting a survey for nonrated Navy personnel to determine accurate job requirements.

Collected data were analyzed and displayed as computer printouts. These printouts and their description have been distributed to users concerned with recruit training curriculum revision, training course requirements, common core development, personnel qualification standards, personnel qualifications for advancement revisions, and naval occupational task program data bank updating. This research report describes statistical methodology used in determining sample size. It also includes sections on research tool and technique design, ship types and numbers surveyed, data collecting methodology, and data reduction and presentation.

CAREER AND OCCUPATIONAL DESIGN (Continued)

Comparative Racial Analysis of Enlisted Advancement Exams: Item-Difficulty. TR 76-6, July 1975. David W. Robertson and Marjorie H. Royle. DDC Availability Number AD-A014 549.

An item-analysis of 24 Navy Enlisted Advancement Exams was conducted to determine which test characteristics might account for the higher promotion rate of White over Black racial groups. Specific questions addressed included (1) whether it is feasible to construct exams containing only items which are similar in difficulty for both Blacks and Whites, (2) what types of items are similar in difficulty, and (3) whether the same items are relatively easy or difficult for Blacks and Whites.

The proportion of items identified as similar in difficulty for both Blacks and Whites varied from one-half to six-sevenths of the 150 items in each test. The similar-type items were concentrated in the difficult range, and presented applied (as distinguished from conceptual) content. Relative item-difficulty was low on some exams.

The development of advancement exams of items similar in difficulty for Blacks and Whites could not be recommended, because the concentration of similar-difficulty items in the difficult range would degrade test quality, and items largely limited to factual content might not cover all necessary content for a particular occupational specialty.

Evaluation of Revised Navy Occupational Information. TR 76-8, August 1975. Leonard Swanson. DDC Availability Number AD-A015 283.

Many enlisted personnel entering the Navy are not well informed about Navy occupations. This leads to some recruits indicating inappropriate preferences and results in dissatisfaction with job assignments and with the Navy. The purpose of this research was to develop improved occupational information about Navy ratings and to evaluate the revised materials.

The existing Navy Occupational Handbook, Careers, was reviewed to see how it might be improved. A revised version, called Navy Ratings Review, was developed. Revisions included (1) making job duties more explicit, (2) improving readability, (3) giving a truer picture of job duties, (4) including information on rating size and advancement opportunities, and (5) enlarging sections on related Navy ratings and civilian jobs.

Careers was made available to one group of recruits and Navy Ratings Review to a second comparable group. Data on usage,

CAREER AND OCCUPATIONAL DESIGN (Continued)

availability, and adequacy of information was obtained from the two groups by means of a questionnaire. Additional information was obtained from classification personnel and from local recruiters who used the Navy Ratings Review.

Among recruits who were not guaranteed school training, 66 percent judged the Navy Ratings Review to be "very useful" whereas 48 percent found Careers to be "very useful" ($p < .01$). Among those guaranteed school training the reverse relationship holds. Most nonrecruit users of the Navy Ratings Review considered it to be useful and important for counseling applicants or recruits.

It was recommended that (1) the Navy Ratings Review be printed and distributed to Navy recruiters and classification personnel, and (2) recruiters be informed of the importance of being completely honest with applicants.

Comparative Racial Analysis of Enlisted Advancement Exams: Relative Item-Difficulty Between Performance-Matched Groups. TR 76-34, April 1976. David W. Robertson and William E. Montague. DDC Availability Number AD-A024 801.

Relationship between item-difficulty of racial groups was measured by the Rho value--the correlation between the two rank-orders of the Black and White item-difficulty levels. The notion of test bias in the Rho value is that, if the test is measuring the same type of ability in two groups, the same items should be relatively the easiest and most difficult for both groups--this should hold even though substantial differences may exist between two groups in total test scores or in percentage answering an item correctly. Since other studies have found that relative item-difficulty is a function of test-taking ability, this study compared item-response relationships between Black and White groups matched on test score.

A "minority" matched White group was extracted from the total White group by applying a linear programming solution to minimize the squared difference between test scores of individuals in the Black group and the "minority" White group selected. Rho values were calculated: (1) across-race--between the Black and majority White groups; and (2) within-race--between the matched White and "majority" White groups. In the comparison of Rho values, lower across-race relationship than within-race relationship would be suggestive of test bias.

CAREER AND OCCUPATIONAL DESIGN (Continued)

The linear programming procedure was quite useful in identifying test performance-matched groups. The across-race Rho values were slightly but consistently lower than those of within-race, suggesting that some small amount of bias (as defined for this analysis) may be present. The findings were considered only suggestive and tentative, since the analysis employed internal and conceptual, rather than external, criteria of test bias.

HUMAN PERFORMANCE IN NAVY SYSTEMS

Survey of Unit Performance Effectiveness Measures. TR 74-11, January 1974. Orvin A. Larson, Stephen I. Sander and John H. Steinemann. DDC Availability Number AD-774 919.

Improved measures of performance effectiveness are required by the Marine Corps for its combat unit training program in order to ensure the maintenance of appropriate levels of unit readiness in accordance with its assigned mission.

A survey to determine the state-of-the-art of performance assessment systems and methodologies was conducted as an initial research phase in support of this requirement. A two-fold effort was made to review the research literature in such areas as performance evaluation, decision making, and unit training, and to gather first-hand information about existing performance assessment systems.

This broad informational survey provides a number of alternative theoretical and practical methodologies which may serve as feasible approaches in ensuing research.

Personnel Subsystem Criteria and Standards for the Amphibious Assault Landing Craft (AALC) Navy Trials. TR 74-30, April 1974. Richard H. Gaylord. DDC Availability Number AD-919 313L.

This report is the first in a series concerned with personnel subsystem test and evaluation of two experimental air cushioned amphibious assault landing craft. It provides the basis for developing the test plan and memoranda to be employed during Navy Trials of the experimental craft with the objective of developing information necessary to optimize personnel subsystem considerations during design of a production prototype. Specific measurement, information gathering and analytical techniques appropriate to this objective are identified and recommended for use in the Navy trials of the experimental craft.

Advancing the Application of Job Performance Aids Within the Navy: II. Mail-Out Surveys of Machinery Repairman and Commissaryman Ratings. TR 75-14, September 1974. Ray E. Main. DDC Availability Number AD-A001 688.

Job performance aids (JPAs) are devices or materials that provide information to assist workers on the job. In this study, mail-out survey forms were evaluated as a method for determining whether current uses of JPAs are adequate, for identifying requirements for increased utilization of such aids, and for soliciting suggestions for JPA appli-

HUMAN PERFORMANCE IN NAVY SYSTEMS (Continued)

cations. Forms were sent to groups of Machinery Repairman and Commissaryman personnel who differed in pay-grade level and duty assignment. The use of mail-out survey forms was found to be an effective method for identifying characteristic practices of JPA implementation within ratings. A general need for furthering the utilization of JPAs was identified, both in terms of developing new aids and of improving distribution of present aids. While respondents were generally helpful in identifying task areas where aids may be needed, relatively few were able to provide suggestions for specific applications. Considerations for follow-up studies utilizing direct contact survey methods are discussed.

Development of Unit Performance Effectiveness Measures Using DELPHI Procedures. TR 76-12, September 1975. Orvin A. Larson and Stephen I. Sander. DDC Availability Number AD-A015 963.

A research effort to develop measures of effectiveness for unit performance was undertaken in support of the Marine Corps Tactical Warfare Analysis and Evaluation System (TWAES) requirements. The DELPHI, a technique for eliciting judgments, was used as the primary research approach. Performance evaluation items of both a contextual and response nature were developed. These items were tentatively categorized by unit level and type of performance.

Shipboard Facilities Maintenance and Manpower Utilization: Problem and Approach. TR 76-22, November 1975. Melvin A. Schwartz. DDC Availability Number AD-B008 194L.

New concepts for accomplishing shipboard facilities maintenance have been developed which should improve performance, morale, motivation, and training level of shipboard personnel. The concepts involve a new division of labor, specialized training, and the use of new equipment, materials and procedures.

A test approach has been developed to demonstrate the technical feasibility of the concepts in a Fleet operational environment. The approach includes evaluation of changes in cleanliness and appearance of shipboard spaces, attitudes toward condition of spaces, and skill/knowledge of facilities maintenance personnel.

A set of hypotheses and associated measurement devices have been presented and statistical tests of these hypotheses will be performed following at-sea data collection.

HUMAN PERFORMANCE IN NAVY SYSTEMS (Continued)

Facilities Maintenance Demonstration Study. TR 76-29, January 1976.
Melvin A. Schwartz. DDC Availability Number AD-B009 681L.

Facilities Maintenance (FM), as currently performed by shipboard personnel, requires a considerable expenditure of man-hours and material resources.

Due to a number of problems and practices, FM is not performed efficiently. As a result, man-hour expenditures are excessively high; ship's condition, cleanliness, and appearance deteriorate; crew morale and motivation are undermined; and cost to the Navy is increased. Potential solutions to underlying problems were studied on an operational ship of the FF 1052 class. The solutions included a team approach to the FM work, an information management system for work scheduling, audiovisual training program in FM, improvements in FM equipment and materials, and environmental improvements.

The findings of the study indicated that:

1. A significant reduction in man-hour expenditures and cost to the Navy is feasible through a systematic innovation program.
2. Skill and knowledge of FM team personnel were significantly improved.
3. Shipboard spaces are cleaner and better maintained with FM innovations.
4. Attitude and motivation of FM personnel are not positively affected.

PERSONNEL EDUCATION AND TRAINING

Investigation of Rate-Controlled Speech for Training Applications. TR 74-6, October 1973. John H. Steinemann and Orvin A. Larson. DDC Availability Number AD-769 689.

Two experimental evaluations were conducted to obtain empirical data on the effects of rate-controlled speech variables upon the listening comprehension of Navy trainees using representative Navy training materials.

The results of the first experiment indicated that the intelligibility of rate-controlled recordings produced by a selective deletion device was significantly better than the intelligibility of recordings produced by a systematic deletion device.

The second experiment demonstrated that both speech rate and content difficulty have a significant, but essentially independent, effect upon listening comprehension. Flesch readability data suggest that the difficulty level of representative Navy training materials is too high for the intended population.

The empirical data presented in the report provide a schematic guide for the application of rate-controlled speech to training content.

An Evaluation of the Use of Chemically Treated Answer Sheets. TR 74-9, March 1974. Larry G. Harding, Phyllis A. Salop and Kirk A. Johnson. DDC Availability Number AD-778 339.

This study was an evaluation of chemically treated answer sheets as part of a system of Computer Managed Instruction. The performance of a group of students using chemically treated answer sheets was compared with that of a group using optically scannable sheets in terms of time required to complete course material and errors on an end-of-course test. The results of the study indicate that training time was reduced about 15% by means of the chemically treated answer sheets and associated changes in procedures.

Retention of Text Information as a Function of the Nature, Timing, and Number of Quizzes. TR 74-28, February 1974. Richard C. Anderson, John R. Surber, W. Barry Biddle, Peter M. Zych and Claire E. Lieberman (University of Illinois). DDC Availability Number AD-780 515.

In two experiments a total of 662 high school students read a prose passage, took a verbatim or paraphrase quiz, and a week later completed a verbatim or paraphrase delayed test. Taking a quiz significantly en-

PERSONNEL EDUCATION AND TRAINING (Continued)

hanced performance on the delayed test. Performance was consistently much higher on the verbatim than on the paraphrase forms of quizzes and tests. Fitting the data rather well was a theory which assumes that a verbatim question is best at evoking retrieval of phonologically coded information in short-term memory whereas a paraphrase question is best at instigating transfer of the information into long-term, semantic memory.

Development and Implementation of the Computer Assisted Instruction Study Management System (CAISMS). TR 74-29, February 1974. Stephen M. Allesli, Richard C. Anderson, Thomas H. Anderson, W. Barry Biddle, Bruce R. Dalgaard, Donald W. Paden, H. Richard Smock, John R. Surber and Edward J. Wietecha (University of Illinois). DDC Availability Number AD-780 516.

This paper reports the work accomplished during the initial year of a contract between the University of Illinois and the Navy Personnel Research and Development Center with Advanced Research Projects Agency support. The purpose of the project was to design, try out, and evaluate a system for maintaining attentive study of instructional materials. A CAI system was used for this purpose but, in contrast to most CAI efforts, existing materials were used and students spent minimal time in on-line contact with the computer. The report includes a manual of procedures for preparing test items which maintain attentive study, evaluation of the system, cost projections for use of the system, and a suggested extension of the system.

The Role of Selected Organizational Variables in Learning From Written Instruction. TR 74-31, May 1974. John F. Carter and Carol Carrier (Syracuse University). DDC Availability Number AD-780 789.

Improvement in the readability of Navy textual material obviously depends upon such traditional factors as word and sentence length. It would seem reasonable, however, that if text is to be not only readable, but also learnable and recallable, factors relating to how the ideas in the text are organized will be important.

Two experiments investigated the recall of text with different organizational schemes, read differing numbers of times, by high and low verbal ability trainees.

Using free recall immediately after reading, the first experiment showed very little effect from organizational variables; trainees apparently were able to subjectively organize material even when it was presented illogically. Three rapid readings of the material rather than a single longer exposure resulted in superior recall, and, of course, high verbal ability trainees recalled more. High verbal ability trainees were better able to recall the categories into which the textual material fell.

PERSONNEL EDUCATION AND TRAINING (Continued)

In the second experiment, the organizational factor was increased in strength, trainees either read the passage once or three times but with total time not controlled, and both free and cued recall were measured. Under these conditions, the organizational factor exerted a significant influence on cued recall, but only if the passage were read three times.

Inferences for both educational practice and research are drawn from these findings.

Development and Validation of an Experimental Radiograph Reading Training Program. TR 74-33, June 1974. John F. Brock, Robert G. Wells and Macy L. Abrams. DDC Availability Number AD-782 332.

An individualized program for training radiograph inspectors of welds is described. The program trained subjects better in 13% of the time required by the previous training program. The current NDT certification procedure is criticized.

Recognition Memory for Shapes as a Function of Encoding Strategy. TR 75-3, September 1974. Pat-Anthony Federico and William Edward Montague. DDC Availability Number AD-787 641.

The primary purpose of this reported research was to determine how imaginal and verbal encoding strategies interact with various stimulus characteristics to either enhance or retard recognition performance; the secondary purpose of these studies was to test the "conceptual coding hypothesis." A between-groups multivariate factorial analysis of covariance experiment and a within-subjects (Ss) multivariate factorial analysis of variance experiment were conducted. In Experiment I, it was found that low codability (LC) shapes were better recognized under the verbal encoding set rather than the imaginal encoding set; and high codability shapes were equally recognized under the imaginal and verbal encoding sets. However, in Experiment II, where instructional set was a within-Ss factor, it was found that LC shapes were not better recognized under the verbal encoding set than the imaginal encoding set. These findings were discussed within the context of the studies, theories, and models brought to light in the extensive review of the relevant literature which had been conducted previously.

PERSONNEL EDUCATION AND TRAINING (Continued)

Computational Achievement of Group IV Trainees With a Self-Study Format: Effects of Introducing Audio, Withdrawing Assistance, and Increasing Training Time. TR 75-11, September 1974. R. E. Main. DDC Availability Number AD-A001 687.

A series of experiments was performed to determine levels of computational skills that could be achieved by Group IV trainees (personnel with marginally acceptable preinduction scores on the Armed Forces Qualifications Test) after training which utilized the Practical Arithmetic Self-Study (PASS) course. The effects of providing supplementary audio materials, decreasing assistance from instructors, and increasing training time were investigated. In general, PASS course training was found to be highly effective in the printed format. Without direct assistance from instructors and with as little as 15 hours of instruction, the average level of performance was raised by approximately one full grade. Supplementing or replacing printed instructions with audio instructions produced no advantage. Extending training time to 24 hours allowed more trainees to complete the coursework and resulted in significantly higher gain scores. Criterion achievement was found to be related to initial levels of performance even for trainees who had completed most of the coursework. Implications of these findings are discussed with reference to the potential utilization of Group IV personnel.

Acquisition of a Psychomotor Skill Using Simulated-Task, Augmented Feedback (Evaluation of a Welding Training Simulator). TR 75-13, October 1974. Macy L. Abrams, Harvey B. Schow and James A. Riedel. DDC Availability Number AD-A000 818.

The present investigation evaluates the effectiveness of simulated-task, augmented feedback on acquiring a physically complex, continuous three-dimensional psychomotor skill. Since the device designed to provide the feedback was an arc-welding training simulator, the study also evaluates its training effectiveness. Data from the study support the hypothesis that simulated-task, augmented feedback is significantly superior to that provided by the task itself.

An Evaluation of Intercultural Relations Training For Navy Overseas Personnel. TR 75-18, January 1975. A. W. Lau and P. N. Blanchard. DDC Availability Number AD-A005 365.

Relatively little data exist concerning the effectiveness of Navy intercultural relations (ICR) training programs. In addition, much training research in this area is characterized by methodological and design inadequacies. The purposes of this study were to design and test a methodological model and to provide an objective assessment of ICR training impact.

PERSONNEL EDUCATION AND TRAINING (Continued)

It was found that training had a modest but significant effect upon the attitudes of Overseas Duty Training (ODT)/Personnel Exchange Program (PEP) and Human Resource Development Center (HRDC) IDR Personnel. ODT/PEP personnel changed significantly on 13 of 24 scales and HRDC personnel on 9 of 24 scales ($p < .05$). Scales measured self-actualization, flexibility, tolerance of ambiguity, acceptance of self and others, leadership styles, and basic motivational patterns. The failure to detect a greater degree of change may have been due to various test ceiling effects or to the nature of the change process itself.

Although the real test of program impact necessitates validation against external or in-country criteria, the results did indicate that the impact of ICR training, although modest, was consistent with the hypotheses generated for the evaluation of the training objectives of the program.

Computational Performance of Group IV Personnel in Vocational Training Programs. TR 75-23, February 1975. Ray E. Main and Robert J. Harrigan. DDC Availability Number AD-A007 511.

This investigation concerns an evaluation of the performance of Navy Group IV personnel on limited sets of task-related computational operations. Training was tailored to the trainee's level of academic skill and courses were taught within the context of vocational training programs covering linear measurement and recipe conversion. Performance was evaluated both in terms of test score gains and skill level achievement.

For both types of vocational tasks, Group IV personnel achieved significant gains in computational skills as a result of training. However, the levels of computational proficiency achieved were judged to be inadequate for effective task accomplishment within relevant Navy ratings.

Analysis of Training Requirements in the Landing Force Training Commands (NSAP Project PHIB-6-73). TR 75-26, April 1975. C. R. Chiles and R. G. Ryan (NTEC). DDC Availability Number AD-A010 520.

A study was conducted to develop recommendations for the improvement of training methods, equipment, and facilities at the Landing Force Training Commands (LFTCs), Atlantic and Pacific. Information was obtained through review of relevant documentation, interviews and conferences, and on-site visits to both LFTCs. Major conclusions of the study are that: (1) implementation of the systems approach to course design would be a major step in the improvement of LFTC course design methods, (2) greater use of mediated presentations may increase the efficiency of Mobile Training Teams, and (3) computer system simulation technology could be employed to provide training for users of the new automated support systems currently being implemented in the amphibious community. Appropriate recommendations are provided.

PERSONNEL EDUCATION AND TRAINING (Continued)

Training Mathematics Skills with Games. TR 75-28, April 1975. Patrick H. McCann. DDC Availability Number AD-A009 364.

The goal of this study was to test the efficacy of using games presented on the PLATO IV instructional system to provide remedial mathematics training for Basic Electricity/Electronics (BE/E) School trainees.

Two learning tasks which provide the most difficulty for students were selected and instructionally programmed for the PLATO IV system. Drill and practice routines for the two tasks were prepared in three methods. Two games were designed which utilized PLATO IV display capabilities, along with a conventional problem presentation followed by answer feedback routine. A group of students was assigned to each of the counterbalanced order of the independent tasks. Within each group, students received one of the six possible combinations of the three methods (conventional and two games).

No significant differences in performance or training time measures were found between the three training methods. Questionnaire data indicated that students who experienced both game mathematics practice and conventional practice definitely preferred game practice.

Effectiveness of game displays is dependent on reliable PLATO IV system operation. It was observed that the effectiveness of using games as an instructional technique suffered more than that of the conventional method when hardware and software operations were unstable.

Due to favorable student reaction to game practice, further development and evaluation of instructional games are warranted.

A Multifaceted Computer-Based Course Management System. TR 75-30, April 1975. T. H. Anderson, R. C. Anderson, S. M. Alessi, B. R. Dalgaard, D. W. Paden, W. B. Biddle J. R. Surber and H. R. Smock (University of Illinois). DDC Availability Number AD-A010 120

The Course-Management System was designed to integrate books, computers, and live teachers in an effective manner for courses with large numbers of students and instructors. The logistic problems associated with multifaceted instructional programs were solved, in part, by using PLATO--a computer-assisted instruction system centered at the University of Illinois. Students in the computer-managed course acquire basic information and concepts from individual reading. Their attention to the material is maintained and their progress monitored by a previously de-

PERSONNEL EDUCATION AND TRAINING (Continued)

veloped Computer-Assisted Instruction Study-Management System. Lectures and standard quiz sections are little used. The time of instructors is invested in remediation for students having trouble mastering the core curriculum and in teaching seminars. The role of the computer is to manage study behavior, administer on-line achievement tests, and schedule group tutorial and seminar sessions. The system has been tried out with generally favorable results in an introductory college economics course having an enrollment of 360 students.

An Experimental Evaluation of a Computer-Assisted Instruction Study Management System. TR 75-31, April 1975. T. H. Anderson, R. C. Anderson, B. R. Dalgaard, D. W. Paden, W. B. Biddle, J. R. Surber and S. M. Alessi (University of Illinois). DDC Availability Number AD-A010 119.

A Computer-Assisted Instruction Study Management System (CAISMS) was experimentally investigated in the context of an introductory college economics course. The 228 students in the CAISMS and control classes attended similar lecture-discussion classes and received an identical battery of achievement tests and questionnaires during the semester. Results from a multivariate analysis of covariance indicated that the CAISMS group scored significantly higher ($\alpha = 0.05$) on achievement tests than the control group. In addition, analysis of variance showed that the attitudes of CAISMS students were more positive ($\alpha = 0.01$) than those of control students. Attrition rates were approximately equal in the two groups.

Computer Applications in Education and Training: Status and Trends. TR 75-32, April 1975. J. D. Fletcher. DDC Availability Number AD-A009 800.

This report updates information on various developmental efforts in computer-based training and provides information on new developments that may have implications for Navy training. Although projects in the military services are emphasized, major developments in the civilian sector are also reviewed. The range of activities considered emphasizes the use of computers for teaching, and includes a wide variety of computer aids to instruction. Information for this report was gathered from reports supported under ADO 43-03X and from a continuing survey of other developments in computer-based instruction. The information is organized under five major topic areas: military activities, civilian activities, systems developments, current issues in instructional design, and state-of-the-art and Navy training needs. An overview is provided for each of the major topic areas as well as for many subtopic areas.

PERSONNEL EDUCATION AND TRAINING (Continued)

Comparison of a Discovery and Didactic Strategy For Radiographic (X-Ray) Interpretation Training. TR 75-33, April 1975. Robert G. Wells and Macy L. Abrams. DDC Availability Number AD-A009 236.

A comparison was made of the effects of a discovery strategy and a didactic strategy on industrial radiograph interpretation training. Trainees in the discovery group completed the respective program approximately one-third faster than those in the didactic group. There was no difference between the two groups in performance level at the end of training.

A Method for Increasing the Training Effectiveness of Marine Corps Tactical Exercises: A Pilot Study. TR 75-34, May 1975. Eugene H. Rocklyn, Rickey R. Jacobs, Martin A. Magy and Alvin G. Archibald. DDC Availability Number AD-A013 224.

Methods for better utilizing current and to-be-developed simulated combat systems for training officers are required by the Marine Corps to ensure efficient acquisition of combat decision-making skills at battalion and higher levels of command.

In support of this requirement, a review and analysis of several combat training systems helped to identify a set of major training problems. A method aimed at solving these problems and thus increasing the training effectiveness of Marine Corps tactical exercises was formulated and experimentally applied. Results obtained seem promising enough to warrant further development of this training method.

The Development of the NVMA Operator Manual and Training Materials Concurrently With System Development: A Case Study. TR 75-36, June 1975. Alvin J. Abrams, Robert C. Panell, Jr. and Jim D. Winchell. DDC Availability Number AD-B005 578.

This project was undertaken for two purposes: (1) to develop an operator manual and training materials for the Noise-Vibration Monitor Analyzer (NVMA) being developed by the Naval Undersea Center, and (2) to assess the feasibility of developing this software concurrently with hardware. The NVMA has been installed on one submarine, USS PUFFER (SSN 652), for preproduction evaluation. Thus, the quantity of data available is quite limited. However, the consistency of reported data indicates that the operator manual and training materials are effective. The results of a second evaluation aboard PUFFER after a substantial period of sea experience will provide a more definitive answer to the question of effectiveness of the operator manual and training materials.

PERSONNEL EDUCATION AND TRAINING (Continued)

The feasibility of concurrent hardware and software development is also supported by experiences gained in this study. It appears that the gain in shipboard operator readiness resulting from this approach more than compensates for any inefficiency that may be caused by rewriting documents to accommodate design changes during development.

The materials developed are being used, as intended, aboard PUFFER. On the basis of data obtained to date, it is recommended that NAVSEA support other exploratory efforts in the concurrent development of hardware and software systems.

An Evaluation of Computer-Managed Instruction in Navy Technical Training.
TR 75-38, May 1975. Stuart B. Carson, Linda L. Graham, Larry G. Harding, Kirk A. Johnson, G. Douglas Mayo and Phyllis A. Salop. DDC Availability Number AD-A012 638.

The purpose of this project was to develop and evaluate a Computer-managed Instruction (CMI) system that would be less expensive than Computer-assisted Instruction (CAI), would provide a frequency of interaction that falls somewhere between that provided by CAI and that normally provided by CMI, and would handle some of the clerical and administrative burdens that are normally imposed by student-paced instruction. More specifically, a system was developed that would make assignments, grade tests, provide feedback to the student, and provide some of the information needed for the effective control and management of a large-scale system of student-paced instruction. Both the instruction and testing took place off line.

The system was evaluated in two short courses taught at the Naval Air Technical Training Center, Memphis. It was compared to (1) classroom instruction and (2) a system of student-paced instruction that was based on the training materials and tests developed for the CMI system, but which substituted "manual" operations for certain of the operations provided by the computer in the CMI system.

It was found that the use of either form of student-paced instruction led to a reduction in training time of approximately 50% and to slightly higher scores on criterion-referenced tests of student knowledge. There were no substantial differences between the two student-paced systems in terms of training effectiveness. There were several factors which precluded a precise comparison between the two student-paced systems in terms of either cost or cost avoidance, but both were substantially less expensive than current CAI systems.

PERSONNEL EDUCATION AND TRAINING (Continued)

Transfer of Training Following Computer-Based Instruction in Basic Oscilloscope Procedures. TR 76-1, July 1975. Hervey W. Stern. DDC Availability Number AD-A012 637.

As test equipment training becomes more individualized, the student usually has greater opportunity to experiment with the equipment he will be using on the job. Yet, for a variety of reasons, he may have to train on outmoded equipment or have limited exposure to the equipment. Computer-aided individualized instruction can overcome some of these problems. This method of training exposes the student to a wide range of situations where state-of-the-art equipment can be readily simulated.

A program was developed for oscilloscope training utilizing the PLATO IV instructional system. Students trained by this method were compared with those trained in a traditional laboratory setting using an individualized workbook having the same objectives as the PLATO lesson. A performance test administered immediately following training indicated that the two groups had similar levels of overall skill, but differed in some subskill levels. The laboratory-trained group was better at control manipulation, while the PLATO-trained group was superior in using the displays, even though they took longer to perform the test. Following identical laboratory practice, another performance test showed these differences disappeared. Thus, it is concluded that computer-assisted instruction can provide acceptable levels of performance but, with the level of simulation provided in this experiment, needs to be integrated with some actual equipment usage. Student acceptance of the system was satisfactory, but may be enhanced by additional exposure over a broader time frame.

The Effects of Practice and Positional Variables in the Acquisition of a Physically Complex Psychomotor Skill. TR 76-7, July 1975. Macy L. Abrams, Harvey B. Schow and Jon K. Grice. DDC Availability Number AD-A015 282.

The present investigation (1) evaluates distributed/massed practice schedules for learning a physically complex psychomotor skill within the constraints of a real-world learning environment and (2) determines if there are interaction effects between practice and the positional variables in the acquisition of the skill. Distributed/massed practice was studied from two aspects: trial

PERSONNEL EDUCATION AND TRAINING (Continued)

length and session length. Data from the study show that the position in which the task was performed was a relevant variable in skill acquisition, i.e., different practice schedules were optimal for the two positions studied. Distributed sessions were significantly better than massed sessions in the overhead position; distributed trials were significantly better in both positions.

Computer-Based Shipboard Training Administration System (STAS): Development Phase. TR 76-11, September 1975. Charles D. Hayward, Lynn E. Hay and Stanley R. Jaffin (System Development Corporation). DDC Availability Number AD-A015 326.

Computer systems have been used aboard combatant ships to perform functions in support of tactical operations. An additional goal has been the use of computer systems to support nontactical functions, e.g., training administration. A minicomputer system (NOVA 1200) aboard the USS DAHLGREN for other nontactical data management functions was the impetus for the development of a Shipboard Training Administration System (STAS).

Uses of Time-Compressed Speech in a Reading Remediation Program: Some Exploratory Tests. TR 76-13, September 1975. William A. Shennum, Edwin G. Aiken and Gary S. Thomas. DDC Availability Number AD-A015 284

Using time-compressed speech methodology a program was developed attempting to improve reading rate and comprehension of Navy personnel with low reading ability. Four groups of trainees were tested. One group read training text while simultaneously listening to a speeded auditory version of the same text. A second group listened to speeded text without concurrently reading the material. The third group simply read material silently, with no auditory input. The fourth group was a control group which took pre- and posttests only. All groups except the control group showed sizeable but comparable increases in unaided reading rate and comprehension performance. Thus, it appeared that the salient aspects of all procedures provided trainees with specific learning goals and precise feedback on their progress, coupled with teacher encouragement to improve.

PERSONNEL EDUCATION AND TRAINING (Continued)

Learning From Lecture: Investigations of Study Strategies Involving Note Taking. TR 76-14, September 1975. Nicholas H. Van Matre, Edwin G. Aiken, John F. Carter, William A. Shennum and Gary S. Thomas. DDC Availability Number AD-A015 285.

The Navy's continued reliance upon the lecture form of instruction required the optimization of this learning strategy. Two experiments were conducted with college students as subjects in an effort to determine the note-taking strategy most effective for learning from lecture. In Experiment I, students listened to a lecture while engaging in either parallel or distributed note taking. The information density of the lecture and the lecture presentation speed were also varied. In Experiment II, the students engaged in one of four learning strategies involving combinations of note-taking and review procedures with either immediate or delayed review and testing. Results indicated that note taking, by itself, interferes with learning but, when performed in conjunction with a notes review, constitutes the optimal study strategy. Analysis of the notes in connection with recall tests showed that the notes provide a critical control of what was learned. Suggested instructional guidelines for instructors were also provided.

Further Investigations of Coding/Rehearsal Strategies During a Segmented Lecture Format. TR 76-15, September 1975. Gary S. Thomas, Edwin G. Aiken, and William A. Shennum. DDC Availability Number AD-A015 628.

Data from a previous lecture-learning study were combined with data from the current study to provide information on the effects of a filler task used in the previous study, and to compare other coding/rehearsal strategies that have potential for improving learning in a lecture. Results showed that the filler task only slightly reduced performance on a delayed recall test; confirmed a previous finding that, when coding/rehearsal is separated from listening in a lecture setting, recall increases significantly; and indicated that procedures which aid/guide the students' coding/rehearsal behaviors further enhance learning.

PERSONNEL EDUCATION AND TRAINING (Continued)

A Comparison of Three Combinations of Text and Graphics for Concept Learning. TR 76-16, September 1975. William A. King. DDC Availability Number AD-A016 805.

A study was conducted to determine how verbal instruction could be supplemented by visuals and, in particular, how to take pedagogical advantage of the excellent capabilities of the PLATO IV computer-based instructional system. Literature research disclosed little previous information of value on the subject. Three versions of a lesson on the sine-ratio concept were prepared, one with verbal text supplemented with animated graphics, one supplemented with still graphics, and one without graphics (text only). Forty-five students from the Basic Electricity/Electronics School at the Naval Training Center (NTC), San Diego, were randomly assigned to the three versions. A comparison of the pretest and posttest mean scores for each group revealed learning took place in each group, and a questionnaire administered after the posttest revealed that the students gave positive ratings to the instructional materials and presentations. The groups did not differ in time required for training. On the posttest, the animated graphics group had the highest mean performance, but none of the differences between groups were significant. It was concluded that these results are consistent with previous findings suggesting that graphics are more useful for teaching concepts involving time and motion than for concepts involving space, and more useful for tasks involving stimulus identification than for tasks involving terminology or comprehension.

Shipboard Computer Integrated Instruction in General Damage Control: Development Phase. TR 76-17, October 1975. William G. Hoyt, Alfred K. Butler and Charles D. Hayward (System Development Corporation). DDC Availability Number AD-A016 812.

The increasing monetary and temporal costs of shore-based training dictate the need to accomplish more training aboard ship. The purpose of this program is to determine the feasibility of using minicomputer systems aboard ship for instructional purposes. The utilization of computers permits individualized adaptive training procedures.

This report covers the shore-based development phase of a study to determine the feasibility of a shipboard minicomputer system for Computer Integrated Instruction (CII). In CII, instruction is conducted off line and is integrated with on-line testing, diagnostics, and prescriptives. The off-line training media for this effort are programmed instruction, audio visual, and self-study guides. General

PERSONNEL EDUCATION AND TRAINING (Continued)

Damage Control is the prototype subject area because of its criticality during emergency situations aboard ship, and because relatively few shipboard personnel receive training in this area at shore-based schools. This report describes: (1) program development, system operation, and user procedures for CII; (2) design and development of the CII courseware and module tests; (3) shore-based demonstration and checkout; and (4) installation of the CII system aboard a demonstration ship.

The follow-on shipboard test/evaluation will be conducted by the Navy.

An Aid to Independent Study Through Automatic Question Generation (AUTOQUEST). TR 76-18, October 1975. John H. Wolfe. DDC Availability Number AD-A017 059.

AUTOQUEST is a computer aid to independent study. It presents ordinary text to a student at a computer terminal, a paragraph at a time. Using a pattern-matching approach, the system generates a question based on one of the sentences of the text and grades the student's answer. If the student's answer does not match the words of the text, the paragraph is displayed again. Results showed that about 68% of the generated questions were satisfactory and that the errors were largely syntactic, indicating the need for a structural parser to preprocess the sentences. The economic feasibility of AUTOQUEST is discussed and judged to be good within 5 years.

Use of an Interactive General-Purpose Computer Terminal to Simulate Training Equipment Operation. TR 76-19, November 1975. George F. Lahey, Alice M. Crawford and Richard E. Hurlock. DDC Availability Number AD-A019 514.

This research examined a computer-based simulation of operational equipment as a potentially cost-effective training mode. CAI materials simulating use of the Simpson 260-1 multimeter were presented to experimental students at PLATO IV terminals where the frontal topography and external operations of the multimeter were simulated by computer graphics. Control students learned the material from self-paced module booklets.

PERSONNEL EDUCATION AND TRAINING (Continued)

Comparisons of the two groups revealed no significant difference in written or performance tests, but experimental students spent more time in training. It was concluded that simulations of equipment on an interactive general-purpose computer terminal, such as the PLATO IV, are practical and could provide an alternative to the purchase of special training equipments.

Models of the Learner in Computer-Assisted Instruction. TR 76-23, December 1975. John D. Fletcher. DDC Availability Number AD-A020 725.

The adaptability of computer-assisted instruction to individuals should be enhanced by the use of explicit models of the learner. To be appropriate for computer representation, these models must take the form of effective procedures. Such procedures may be derived from four areas of investigation: quantitative models of memory, regression models of performance, automaton models of performance, and artificial intelligence. Relevant work in these four areas is identified and reviewed.

A Comparison of Adaptive and Nonadaptive Training Strategies in the Acquisition of a Physically Complex Psychomotor Skill. TR 76-24, December 1975. James A. Riedel, Macy L. Abrams and David Post. DDC Availability Number AD-A018 880.

The relative effectiveness of using adaptive and nonadaptive (fixed) strategies to facilitate acquisition of a physically complex psychomotor skill was investigated. In addition, task and practice difficulty levels were studied. Sixty subjects were each given pre- and posttraining tests and the data were evaluated by analysis of covariance. Results suggest no significant difference between fixed and adaptive techniques for the skill studied. The results are discussed and recommendations made.

The Graphics Terminal Display System: A Powerful General-Purpose CAI Package. TR 76-25, December 1975. F. W. Hornbeck and L. Brock (San Diego State University). DDC Availability Number AD-A020 814.

The report describes a system developed to support research and development in computer-based instruction. A powerful and versatile CAI language was developed which allows authors to present materials on a graphic display, on slides, or by means of voice synthesizer. The language was developed on an IBM 360/50 computer and is transportable to other similar machines. Comparisons are made between this system and others, such as PLANIT, PLATO, and TICCIT.

PERSONNEL EDUCATION AND TRAINING (Continued)

Personnel Characteristics Relevant to Navy Technical Manual Preparation.
TR 76-26, December 1975. William H. Githens, William A. Shennum and William A. Nugent. DDC Availability Number AD-A019 366.

The effectiveness of alternative presentations of technical material may rest heavily on the technicians' characteristics. This study attempted to identify technician personnel characteristics which should be taken into account by technical manual writers/editors during TM preparation. Reviews of the literature, consultation with experts in the area, and interviews with Navy technicians were used as data sources. It was found that personnel characteristics could be grouped into aptitudes, background factors, and attitudes, which could, in turn, be related to reading comprehension and technician job performance. A method was proposed which would enable technical manual writers/editors to determine the characteristics of the group of probable users of a specific TM.

Adaptive Computer-Assisted Tutorials: A Cybernetic Approach Optimization With Finite-State Machines. TR 76-33, March 1976. Joseph Offir. DDC Availability Number AD-A024 712.

The report outlines a formal approach to computer-based adaptive tutorial systems. A description is provided of the components that such a system must have in order to improve dynamically the performance of an individual trainee, with respect to prechosen criteria, in a sequential process of formal problem solving.

Learner Control of Lesson Strategy: A Model for PLATO IV System Lessons. TR 76-36, June 1976. G. F. Lahey, A. M. Crawford, and R. E. Hurlock, DDC Availability Number AD-A025 249.

The objectives of this research were to develop a technique to facilitate creating computer-based instruction (CBI) with a minimum of effort on the part of the author/coder, and to investigate the feasibility of using a structure which puts control of lesson strategy into the hands of the student learner. It was a major premise that the lesson development technique should be useable over a wide variety of subject matters and should require no special expertise on the part of the author preparing the lesson materials or of the individual encoding them for use.

PERSONNEL EDUCATION AND TRAINING (Continued)

A model was developed in which each CBI lesson is composed of two distinctly separate parts: a strategy section or driver common to all such lessons and a content section peculiar to each lesson. The strategy section is a set of control units which is completely independent of the nature of the subject matter of the lesson.

Within the content section of lessons prepared according to the model, subject matter is segmented by learning objectives and is broken down into rules, examples, and practice problems pertinent to each objective. Provision is made for easy, medium and hard levels of difficulty for each type of content.

The strategy section of this model puts lesson control in the hands of the student learner by allowing him a free choice of the sequence in which he sees lesson segments (learning objectives) and types of content (rules, examples, practice). The model has been evaluated using several types of subject matter which have demonstrated both the feasibility and flexibility of the approach used.

PERSONNEL MANAGEMENT

The Theory and Application of Linear Decision Programming. TR 75-4, November 1974. Gordon B. Hatfield. DDC Availability Number AD-A002 455.

An investigation of mathematical forms that generalize the ordinary linear programming problem has led to the identification of a problem termed the "decision programming" canonical form. The study of this canonical form indicates the possibility of unifying certain theories and methods of decision-making, i.e., (1) linear programming, (2) vector maximization, (3) goal programming, (4) two person zero-sum games, (5) the Chebyshev approximation problem, and (6) "satisficing." It is shown that solving a certain linear decision programming problem is equivalent to solving a linear vector minimization problem for an efficient point. Also, it is shown that a two-person, zero-sum game is equivalent to a linear decision programming problem where the payoff matrix is the set of goals. Satisficing follows directly from the canonical form by considering inequality goals. A general algorithm, called the minimum distance method, is developed for a class of decision programming problems.

Development and Evaluation of a Primal-Dual Method for the Solution of Non Linear Programming Problems With Linear Constraints. TR 75-8, October 1974. G. B. Hatfield. DDC Availability Number AD-A001 280.

A general algorithm for solving the class of nonlinear programming problems that have linear constraints has been developed. The constraints can be either equations or inequalities and the variables can be free or nonnegative. The objective function is assumed to be continuously differentiable. The algorithm is an "effective" second-order method in that slow convergence is eliminated without requiring second partial derivations. It combines the desirable features of projection methods, conjugate gradient methods, and methods that solve LP problems to obtain feasible directions. Computational results on a wide variety of test problems are given. The comparison of two nonlinear programming algorithms --the primal-dual and the ricochet gradient--was employed as the vehicle for evaluating practices and standards employed in testing algorithms. While the primal-dual algorithm was found to be "superior" on a number of standard test problems, it is observed that the multiplicity of conflicting criteria generally employed in testing algorithms generates arbitrariness in the evaluation process.

PERSONNEL MANAGEMENT (Continued)

Instructions for Use of the Primal-Dual Algorithm for the Solution of Nonlinear Programming Problems with Linear Constraints. TR 75-8a, October 1974. Gordon B. Hatfield. DDC Availability Number AD-A002 456.

Instructions for solving the nonlinear programming problem with linear constraints using the primal-dual method are given. A brief exposition of the problem is followed by instructions concerning program input and output, deck set-up, and some comments on problem strategy.

Use of the Operation Sequence Diagram as a Planning, Monitoring and Control Tool in Resource Planning. TR 75-10, October 1974. Elmer S. Hutchins, Jr. and Paul T. Conway. DDC Availability Number AD-A000 811.

An experiment is conducted to determine if the Operation Sequence Diagram (OSD) Technique, which is primarily a human factors tool, could be adapted as a planning, monitoring, and control device in the area of resource planning. In the discipline for which it was designed, the OSD is most useful for simulation of system reaction to change. It was first developed to display the information-decision-action relationships of highly complex man-machine systems. While experimentation in adapting the OSD to a planning system scenario utilized actual data, with appreciable results, it has not been validated in a truly operational environment. Technology advancements in the field of automation (interactive computer graphics) are utilized and it appears that significant improvements to systems understanding can be realized through further exploitation of the automated interactive OSD approach.

A Theoretical Approach to Multiobjective Problems. TR 75-15, November 1974. Gordon B. Hatfield and Joe Silverman. DDC Availability Number AD-A003 453.

The basis for a "synthetic" decision theory has been developed and operationalized through decision programming. The theory is addressed to higher order decision problems characterized by multiple objectives, conflicting goals, and an uncertain decision environment. A novel canonical form embracing three "primitive" concepts--goals, preferences, and constraints--provides a framework which accommodates a wide diversity of decision behavior. In this form, although constraints are treated in the conventional manner, preference ordering may be incomplete (or even intransitive) and goals may be conflicting.

PERSONNEL MANAGEMENT (Continued)

Navy Manpower Planning and Programming: Basis for Systems Examination.
TR 75-19, October 1974. David A. Wedding and Elmer S. Hutchins, Jr. DDC
Availability Number AD-A015 325.

This report contains a compilation of available source information about the Navy manpower planning and programming processes at the onset of a Manpower Requirements and Resources Control System (MARRCS) advanced development project. It describes the functional and organizational elements in manpower planning and programming, their interlocking relationships, and the structure of the system under which requirements for the human resource variable in the system are determined.

An Approach and Instrumentation for Management System Analysis. TR 75-20, October 1974. David B. Barefoot and Frank R. DiGialleonardo. DDC Availability Number AD-A014 550.

This report specifies an approach for accomplishing system analyses of complex management functions. A data collection instrument designed for mapping the communications network of the Navy manpower planning system is described. The instrument solicits from system participants the data necessary to trace both formal and informal information flows and make cost-benefit judgments about specific communications. The format developed for organization of the collected data is especially suitable for descriptive network analysis. Additionally, it provides a framework for comparison of producer and consumer views of the raw data and intermediate information products generated and utilized within the management system. Such comparisons are indispensable to diagnosis of possible system malfunctions and the prescription of changes.

An Approach for Measuring Benefit and Cost in Management and Information Systems. TR 75-21, October 1974. Frank R. DiGialleonardo and David B. Barefoot. DDC Availability Number AD-A014 209.

A technique is developed for assessing benefit and, to a more limited degree, cost in order to permit meaningful cost-benefit analysis of management and information systems. The technique is most immediately a response to requirements in analyzing a large and complex manpower planning and programming system. It is more generally a response to an apparent gap in existing cost benefit methodology in regard to obtaining useful performance measures in managerial information systems.

PERSONNEL MANAGEMENT (Continued)

A model with three prime determinants of benefits is postulated: potential contribution, received value, and utilized value. Other candidate factors are also considered, notably feedback. A methodology for costing inputs and outputs is also developed as an important complement to the benefit measures. Analysis results are presented for preliminary data gathered via a questionnaire. Alternative models for considering the measures are discussed. A plan for detailed analysis of the model using extensive data now being collected, in addition to proposed laboratory experimentation, is presented.

Technique for Interactive Systems Analysis (TISA). TR 75-22, October 1974.
Frank R. DiGialleonardo, David B. Barefoot and Thomas A. Blanco. DDC
Availability Number AD-A013 223.

The field of systems analysis has traditionally been devoted to obtaining the necessary basis for design or redesign of hardware systems. While this analytic capability is no less desirable for "soft" systems, applications in that area have been hampered by data deficiencies, difficulties in system definition, and the specification of desired performance, measurement problems, and the like. In response to the problems, a Technique for Interactive Systems Analysis (TISA) has been developed. TISA is a computerized technique for conducting system analysis in a conversational mode from interactive terminals. TISA uses networking algorithms to access and structure system descriptive data from computer files. It can apply various analyses to these data and has the capability to display resulting system networks through the medium of computer graphics. TISA has been further developed as an analytic tool for the design, development, and management of organizational processes.

FACTORS IN PERSONNEL EFFECTIVENESS

A Study of the Factors Influencing Career Motivation Among Navy Physicians and Dentists. TR 74-17, February 1974. Claude Braunstein. DDC Availability Number AD-775 948.

This study was designed to assess the factors influencing the career motivation of Navy physicians and dentists and to evaluate differential career incentives. A structured multiple-choice mail questionnaire was administered in March 1973. Twenty-six job factors were found to be related to job satisfaction among physicians and dentists. The respondents expressed satisfaction with such factors as amount of personal responsibility, relationships with colleagues, security of employment and amount of free time. They were dissatisfied with such factors as remuneration, quality of facilities and equipment, and the amount of participation they had in making decisions affecting their careers. Both physicians and dentists expected job satisfaction to be potentially higher in civilian life than in the Navy. Twenty-five recommendations were made to improve job satisfaction and retention among physicians and dentists in the Navy.

The Relationship of Internal-External Control to Work Motivation and Performance in the Navy. TR 74-21, April 1974. Laurie A. Broedling. DDC Availability Number AD-779 001.

The effectiveness of the naval work force is dependent in part on the motivation of its individual members to do a good job. This study was directed toward understanding what certain of the components of work motivation are. The primary concept studied was Internal-External Locus of Control, which represents a person's perceptions of the extent to which he feels in control of his environment (internal view) vs. feeling that events in his life are a result of forces beyond his control (external view). Also, the extent to which intrinsic vs. extrinsic factors contribute to work motivation was studied. A Valence-Instrumentality-Expectancy (VIE) model of motivation was employed.

A questionnaire was administered to a cross-section of 207 naval personnel which comprised over 50 work groups. A rating form was given to the supervisor of each work group.

It was found that internals more than externals are motivated to work hard, are better performers, see working hard as being instrumental to attaining desirable outcomes, have less role conflict and ambiguity, and tend to be in higher pay grades. It was also found that intrinsic motivation, as operationally defined in this study, contributed much more to total motivation than did extrinsic motivation.

It was concluded that, other things being equal, it is better to have internals on the job than externals. Additional ramifications for organizational psychology are discussed.

FACTORS IN PERSONNEL EFFECTIVENESS (Continued)

Perceptions of Discrimination in Nonjudicial Punishment. TR 74-22, June 1974.
Patricia J. Thomas, Edmund D. Thomas and Samuel W. Ward. DDC Availability
Number AD-784 141.

Nonjudicial punishment is frequently the target of charges of racial discrimination which are difficult to refute because the data needed for documentation are largely unrecorded. The purposes of this study were to determine whether existing records indicate that nonjudicial punishment is administered without regard to race and if blacks and whites perceive discrimination in discipline, job assignments, and advancement opportunity.

A biracial pair of Chief Personnelmen boarded over 70 ships on both coasts to record disciplinary data and administer the Attitude Evaluation Form (AEF) to 324 sets of personnel. A set consisted of a black and a white offender and a biracial pair of nonoffenders, all in their first enlistment and in the same division.

Blacks committed somewhat more confrontation offenses while whites committed more military/civilian crimes. No differences were found in punishments awarded offenders, although executive officers dismissed more of the black offenders.

The perceptions of blacks and whites differed significantly on all items in the AEF concerning equality of treatment in the Navy and on more than half of the job satisfaction and supervisor supportiveness items. Few response differences were found between offenders and nonoffenders and east and west coast personnel. Item intercorrelations indicated that the interest in the man displayed by the supervisor was significantly related to low perceptions of discrimination and to high job satisfaction. The analysis of the written comments revealed that the majority of blacks believed military justice favors whites. Many whites shared this belief.

Although this study did not reveal differences in disciplining blacks and whites, equality of treatment in nonjudicial punishment has not been established. The written comments indicated discriminatory practices may be occurring prior to filing a report of an offense.

Development of a Social Distance Scale. TR 74-23, April 1974. Aaron Katz and Paul P. Foley. DDC Availability Number AD-780 439.

A pool of 34 items were presented to 276 enlisted personnel for evaluation of the degree of personal interaction implied in each statement. The distribution of judgments resulting from this procedure served as a basis for establishing social distance scale values through use of the method of successive intervals. Nine items were selected for the

FACTORS IN PERSONNEL EFFECTIVENESS (Continued)

final scale on the basis of having met the following criteria: (1) coverage of a wide range of closeness in personal interaction, (2) non-overlapping of item content, and (3) approximately equal size in social distance between items.

Stability for the items was established by correlating the scale values based on random halves of the total sample ($\rho = .97$).

This scale, designed to measure willingness to engage in social contact with host country nationals, will be incorporated into survey instruments covering issues of living in an overseas environment.

The Effects of Leadership Style and Situational Favorability Upon the Perception of Uncertainty and Risk. TR 74-26, June 1974. Delbert M. Nebeker. DDC Availability Number AD-782 520.

Some recent research on Fiedler's contingency model has shown support for an interpretation of situational favorability as a perceived environmental uncertainty dimension. Such an interpretation has a number of advantages including the possibility that such an interpretation of situational favorability enables Fiedler's work to be integrated with other contingency approaches currently receiving supportive attention. This research reports the results of a study which examines the relationship between situational favorability and the perception of uncertainty and risk in an experimental setting, thereby providing a test of the validity of the relationship.

Seventy-one subjects were presented four paper and pencil simulations of leadership situations based on Fiedler's model. Estimates of perceived uncertainty and risk were derived from a number of scales presented to the subjects following each situation.

Analysis results indicated that uncertainty and risk was significantly related to situational favorability with favorable situations having certainty and little risk while unfavorable situations were uncertain and risky. Fiedler's scale of the leader's esteem for his least preferred co-worker (LPC) was not related to the major dependent variables.

These results support an interpretation of situational favorability as a dimension of perceived uncertainty, validating previous research and suggesting the possibility of integrating Fiedler's work with other contingency theories as well as decision research.

Description of an "Ideal" Change Advocate in a Technical Navy Setting. TR 74-34, May 1974. Alvin J. Abrams, John P. Sheposh and Mark H. Licht. DDC Availability Number AD-782 331.

This report describes the first phase of a larger effort. The purposes of this study were to determine: (1) whether fleet technical

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personnel could accept the Change Advocate concept within their team, (2) what characteristics are deemed important for a Change Advocate in the shipboard setting, (3) whether some technical personnel presently aboard ships possess the characteristics deemed essential for the Change Advocate, and (4) whether responses from technical personnel are generalizable across platforms.

Eighty-three technicians and nine division officers from four submarines, three destroyers, and three repair shops of two submarine tenders served as subjects. They each responded to a questionnaire which required nominations for a Change Advocate within their team, ratings of their nominees and ratings of the importance of 25 traits, and responses to a set of sociometric items.

Results revealed that: (1) most technicians evaluated the Change Advocate role as being very important, (2) most technicians who might be qualified for the role desired the role, (3) technicians who were nominated by team members to be the Change Advocate were described as competent and motivated, (4) effectiveness and competency as a technician, skillfulness in communications, and flexibility were the major requisites of the "ideal" Change Advocate, and (5) overall, responses by technicians were not platform specific.

The Measurement of Organizational Effectiveness: A Review of Relevant Research and Opinion. TR 75-1, July 1974. John P. Campbell, David A. Bownas, Norman G. Peterson and Marvin D. Dunnette (Personnel Decisions, Inc.). DDC Availability Number AD-786 462.

The general topic of defining organization effectiveness is addressed. While no succinct definition is provided, a construct of organizational effectiveness is recognized. Existing theory, research, and practice surrounding the construct has been searched and current measurement techniques have been cataloged along with summaries of various theories and models. Alternative methodological approaches and manifest characteristics of organizations in terms of effectiveness are considered. A compilation of independent, dependent, and intervening variables is presented. Suggestions are offered for future research in the Navy setting in the area of organizational effectiveness.

A Test Approach for Evaluating the Ship Controlman Reduced Manning Concept. TR 75-17, November 1974. Robert A. Sniffin. DDC Availability Number AD-B001 020L.

A new bridge manning concept has been developed that should improve bridge performance, morale, motivation, and training levels of the bridge watchstanders. The concept is known as the Ship Controlman concept and

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is based on a new division of labor, organizational structure, and training. A test approach has been developed to evaluate the technical feasibility of the concept in a fleet-operational environment. The approach includes evaluation of the change in skill/knowledge, job attitudes, work motivation, and at-sea bridge watch performance. The overall test approach developed is to conduct a longitudinal-operational experiment using two DE 1052 class destroyers.

A set of research hypotheses is presented, and appropriate measurement instruments developed to collect quantitative data are described. The hypotheses will be tested statistically.

It is proposed that the test approach presented in this report be used to evaluate other shipboard manning concepts in a fleet-operational environment.

An innovative approach to measuring job attitudes and behavior has been developed for this program which has broad theoretical and practical implications. An expectancy theory approach has been used in developing the attitude/motivation questionnaire. The model should prove useful in predicting and explaining job attitudes and behavior across a wide spectrum of Navy personnel and environments.

Combat System Performance Based on 3M Maintenance Data. TR 75-25, April 1975. H. L. Williams and L. S. Standlee. DDC Availability Number AD-A008 328.

A Combat System Department was implemented aboard selected pilot ships with the goal of improving maintenance effectiveness. Pilot and control ships were compared on the basis of data collected and supplied by the MSO 3M reporting system. The data failed to demonstrate that improved maintenance effectiveness resulted from implementation of the new organizational structure. Limitations of the data are discussed.

The Cross-Cultural Interaction Inventory: Development of Overseas Criterion Measures and Items that Differentiate Between Successful and Unsuccessful Adjusters. TR 75-27, April 1975. Ted M. I. Yellen and Sandra J. Mumford. DDC Availability Number AD-A009 362.

The purpose of this research was to develop an instrument which could be used to supplement procedures for screening and selecting personnel for overseas assignment.

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A Biographical, Interest, Attitude Inventory (BIAI) was constructed and administered with the Strong Vocational Interest Blank (SVIB) to Navy personnel stationed in Japan.

Results of concurrent validation analyses indicated that: (1) selected items differentiated with high accuracy between successful and unsuccessful overseas adjustment, (2) attitude items were more useful in differentiating between successful and unsuccessful adjustment than the biographical and interest type items, and (3) items in the SVIB, as a whole, did not differentiate between successful and unsuccessful adjustment.

The 38 BIAI items which differentiated with high accuracy between successful and unsuccessful adjusters in Japan were incorporated into a predictor instrument called the Cross-Cultural Interaction Inventory (CCII). The CCII is presented in Appendix F.

A Comparison of the Effects of Individual and Team Performance Feedback Upon Subsequent Performance. TR 75-35, May 1975. Delbert M. Nebeker, Steven L. Dockstader and Ross R. Vickers, Jr. DDC Availability Number AD-A010 131.

This study sought to determine the effects of performance feedback presented to subjects acting singly or as members of a team. The experimental questions addressed were whether being identified as a team member enhances performance and whether individual performance in groups is affected by variation in the amount and specificity of the feedback provided. The results indicated that subjects who were a part of a team, and felt so, did not perform at significantly higher levels than nonteam members, when the effects of feedback were controlled. It was also found that any sort of feedback resulted in increased performance. Increasing the amount or specificity of the feedback provided had no additive effect.

Survey of Enlisted Personnel Assigned to DLG Combat System Department. TR 76-2, July 1975. Del H. Sass and Lloyd S. Standlee. DDC Availability Number AD-A013 225.

The combat system program was initiated to improve electronic maintenance effectiveness. The resulting shipboard reorganization brought all electronic technician ratings under the cognizance of the newly designated Combat System Department. Before Navywide implementation, a number of pilot ships were designated for test

FACTORS IN PERSONNEL EFFECTIVENESS (Continued)

and evaluation. As part of the evaluation, a survey was made of enlisted personnel. The survey included data on work assignment, training, rating structure, and career satisfaction. Overall, the combat system program has had a favorable impact on the enlisted personnel and is perceived as having brought about desirable improvements. However, changes to the initial organization and in personnel management practices are indicated.

Attitudinal and Demographic Characteristics of Company Commanders: A Comparative Analysis Across Recruit Training Centers. TR 76-4, August 1975. Wilfredo R. Manese, Melitta Skrobiszewski, and Norman M. Abrahams. DDC Availability Number AD-A013 991.

To provide background information for an ongoing study (seeking to develop psychometric measures predictive of company commander effectiveness), a survey questionnaire was administered to company commanders at the Navy's three recruit training centers. The survey assessed the comparability of the training centers in terms of the demographic characteristics, satisfaction levels, and job-related attitudes of onboard company commanders. In addition, data from this study were compared with similar data collected in a 1957 survey.

Human Resource Management and Nonjudicial Punishment Rates on Navy Ships. TR 76-5, August 1975. Kent S. Crawford and Edmund D. Thomas. DDC Availability Number AD-A013 226.

At the core of the Navy Human Goals Plan is the process of Human Resource Management (HRM), which is designed to assist commands in improving assessed organizational weaknesses. Diagnosis of a Navy unit's organizational "state of affairs" is accomplished by administration of the HRM Survey. The purpose of this study was to investigate the relationship between indices of the HRM Survey and rates of nonjudicial punishment (NJP) on Navy ships. It was hypothesized that the more effective the human resource management system within a ship, the lower the NJP rate.

Aggregated NJP statistics for two 6-month reporting periods were obtained for 41 ships from 3 type commands. NJP data were then standardized to the number of NJPs per 100 enlisted men per month. HRM Survey data were aggregated for each ship to generate overall mean scores for 16 indices.

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All correlations between HRM Survey indices and NJP rates were in the predicted direction, i.e., the better the organizational conditions, the lower the NJP rates. Comparisons of extreme groups on the HRM Survey indices revealed that the NJP rates among the high-scoring ships were about half the magnitude of the low-scoring ships.

The findings strongly suggest that the NJP rates are related to the type of human resource management system present within a ship.

Feasibility of and Design Parameters for a Computer-Based Attitudinal Research Information System. TR 76-9, August 1975. Diane M. Ramsey-Klee, Vivian Richman and Gio Wiederhold (R-K Research and System Design). DDC Availability Number AD-A014 551.

This technical report presents the findings of a study of the feasibility of developing a computer-based attitudinal research information system (RIS) for the field of Navy personnel research. The requirement for an RIS is generated from the fact that most data bases for Navy personnel and attitude research are not now retrievable and usable for secondary analysis or trend analysis. In addition to making an assessment of overall feasibility, this report contains recommendations regarding how such a system should be designed, implemented, and administered. Literature reviews in several topic areas are presented, including information science, computer methodology, human factors considerations in on-line system design, and cost-benefit analysis. The audience of readers potentially interested in this report would be librarians, information scientists, and indexers; system designers, system analysts, data processing personnel, and computer programmers; economists; and managers of data processing facilities and research activities.

Specifically, the following subjects are addressed in this report: information needs and requirements of Navy personnel researchers and managers, information indexing alternatives, data base design alternatives, the operational interface between users and a computer-based information system, system design and implementation requirements for an attitudinal RIS, and cost-benefit considerations. A selected listing and description of social science data archives is included as well as a partial inventory of data bases that are candidates for inclusion in an attitudinal RIS. The conclusions and recommendations of the feasibility study team complete this report.

FACTORS IN PERSONNEL EFFECTIVENESS (Continued)

The Use of Evidence in Influencing Technician Attitudes. TR 76-10, September 1975. Alvin J. Abrams, John P. Sheposh and Mark H. Licht. DDC Availability Number AD-A017 602.

This report describes the second study in a larger research effort to assess the effect of a Change Advocate role and a change model in the introduction of a new hardware system. Previous research has shown that specific negative attitudes of technicians negatively affect system utilization. This study focused on a practical means of enhancing experienced technicians' awareness of the existence and adverse effects of their negative attitudes, while not discrediting the existence of other causative factors which technicians correctly recognize. Objective evidence in the form of shipboard observations on the ASROC system was used to bring about the desired end.

Forty-nine fleet-experienced technicians served as subjects. All were second-class petty officers and above, and their average active duty time was over 11 years.

The results revealed that technicians initially blamed implementation problems on causes which were external and rejected internal causes such as their attitudes. However, following exposure to the ASROC observations, technicians agreed that their attitudes as well as the external factors had a negative effect on implementation, maintained positive expectations of new hardware systems (with some decrement), and were less positive in their evaluations of the effectiveness of Navy hardware systems. A defense statement, which was designed to temper possible overreaction to the ASROC observations, had little effect.

Department of Defense Family Housing Preference Survey: Attitudes and Preferences of Military Personnel and Spouses Concerning Housing and Basic Allowance for Quarters. TR 76-20, November 1975. Susan S. Stumpf and William F. Kieckhafer. DDC Availability Number AD-A018 146.

Questionnaires were administered by mail to a sample of 16,961 married military personnel and 13,625 spouses in the continental United States. The sample was designed to control for paygrade, urbanization level (rural, urban, or metropolitan) and type of housing occupied (government quarters, rented civilian housing, or personally owned housing). Detailed information was obtained on housing style preferences, housing type preferences, potential impact of a fair market rental policy for government quarters, housing satisfaction, attitude toward various proposed policy changes, career motivation, and perceived quality of life.

FACTORS IN PERSONNEL EFFECTIVENESS (Continued)

A correlational model predicted that personal/situational factors, housing choice behavior, and housing attitudes would all be associated with perceived quality of life and career intention. The model's predictions were generally supported, except that housing choice behavior was unrelated to either variable. Both were related to housing attitudes and personal/situational factors, with quality of life showing the stronger association with these variables (military R's = .56 and .41, respectively).

Problem Drinking and Attitudes Toward Alcohol Among Navy Recruits.
TR 76-21, November 1975. Kathleen P. Durning and Erik Jansen.
DDC Availability Number AD-A018 754.

An Alcohol Experiences Questionnaire was administered to 2,045 Navy recruits to determine usage patterns, attitudes, and incidence of self-reported drinking problems for the period before their entry into the Navy. Comparisons were made between this incoming sample and naval personnel, particularly enlisted men, reporting drinking practices on a separate Navywide survey.

Despite legal restrictions affecting many young civilians, 46 percent of recruits (compared to 40 percent of EM) reported heavy intake of alcohol in the previous year, and half of these were very heavy drinkers (12 or more drinks per occasion per week or 8 or more per day). A greater proportion of recruits reported binge drinking than did EM (27 vs. 16 percent). Since recruits as a group claimed more psychological benefits from alcohol consumption, they scored higher than EM on potential problem scales such as psychological dependence. Recruits experienced more belligerence due to drinking than did EM and had higher rates for police problems (21 percent reported "trouble with the law" involving drinking within the last 3 years). Recruits were generally similar to EM on other measures of current problem consequences in the social and health/injury areas within the last 3 years, though EM reported more problems on the job due to drinking.

Extensive alcohol use, adverse consequences of drinking, and permissive attitudes toward drinking and intoxication were found among recruits prior to their initiation into Navy life. The data suggest that a large proportion of individuals who choose to join the Navy already evidence drinking problems. Alcohol misuse may be met with peer encouragement among the newly enlisted men, but cannot be said to be, at this initial stage, a function as such of the Navy organization.

FACTORS IN PERSONNEL EFFECTIVENESS (Continued)

Implications of the findings for alcohol abuse prevention and education are discussed, and research into the peer influence process is recommended.

An Assessment of Nonresponse Bias in Mail Surveys of Naval Personnel.
TR 76-30, February 1976. Laurie A. Broedling and Carol H. Fuller.
DDC Availability Number AD-A021 387.

This study was aimed at identifying the extent and nature of nonresponse bias in direct surveys of naval personnel. It was also aimed at the determination of whether format of the questionnaire affects response rate.

The target population was enlisted, male naval personnel, this being the population with the consistently lowest response rates in direct mail surveys. The approach entailed sending four different questionnaires to two experimental samples over a period of 14 months. The number of questionnaires out of four that each subject sent back was taken to be a measure of his tendency to respond to mail surveys. Each questionnaire used had a different format and/or content, and the differences in response rate in relation to questionnaire form were analyzed. For these purposes, three control groups were sent the second, third, or fourth questionnaire only, in order to avoid contaminating the effects of repeated surveying on response rate.

The main analyses consisted of relating the response proportions of the experimental groups to their demographic and attitudinal characteristics. The results indicated that nonresponse bias does exist in direct mail naval personnel surveys and that the factors which relate to it are quite complex. Multivariate analyses of the attitudinal items in this study showed effects of nonresponse bias. A number of demographic characteristics were consistently related to response behavior, such as pay grade, number of enlistments, number of dependents, and age. Little or no relationship was found between intelligence test score or years of education and response behavior. Questionnaire form was found to have a noticeable effect on response rate. A very short, self-contained postcard format obtained the highest response. Relevance of questionnaire content also had an enhancing effect on response rate.

It was concluded that, because of the complexity of the factors involved in nonresponse bias, it is difficult to determine to what extent it will exist in a given naval personnel survey. It was therefore recommended that a follow-up procedure be used in conjunction with any direct mail, naval personnel survey. A controlled investigation of which types of follow-ups are most accurate and cost effective in which situations is warranted.

FACTORS IN PERSONNEL EFFECTIVENESS (Continued)

Human Resource Management and Operational Readiness as Measured by Refresher Training on Navy Ships. TR 76-32, February 1976. Sandra J. Mumford. DDC Availability Number AD-A022 372.

The Navy in 1973 instituted a Human Goals Plan to ensure both a high level of combat effectiveness and personnel excellence. For the current study, scores earned by ships during Refresher Training (REFTRA) were used as a dependent measure of combat effectiveness or readiness for combat. The indices on the Human Resource Management (HRM) Survey were used as the independent measure of personnel or organizational excellence. The nature and strength of the relationship between these two measures is the focus of this study. It was hypothesized that the more effective the human resource management system within a ship, the higher the REFTRA scores.

REFTRA scores were obtained for 34 ships that had been surveyed as part of the HRM program. Each ship had either one or two scores, depending on which type of REFTRA--full or interim--has been conducted.

Using the overall weighted REFTRA averages for the 16 ships that had undergone full REFTRA, the correlation coefficients between REFTRA and those perceptions assessed by the HRM Survey strongly supported the research hypothesis. All coefficients were in the predicted direction and over half reached significance at the .01 level of confidence. The highest correlations were found with indices that stressed team effort and coordination. The strongly positive relationships were not sustained using the unweighted averages of interim REFTRA. Comparisons of extreme groups on the HRM Survey indices revealed that the high HRM ships scored up to 4.16 points higher in REFTRA.

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FY 1949 - FY 1973. TR 74-15, May 1974. William J. Stinson (Ed.)

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- Volume IV - Classified Reports, FY 1964 - FY 1973
DDC Availability Number AD-919 648

This publication is a consolidated bibliography which lists all technical reports issued during the period FY 1949 through FY 1973 by Navy personnel research organizations in San Diego and Washington, D. C. Abstracts are included where readily available from past records. Within each volume, reports are listed in appropriate subject categories for reference convenience as follows:

- Manpower Management
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Chief, Bureau of Medicine and Surgery
Chief of Naval Research (Code 430)
Chief of Naval Research (Code 450) (4)
Chief of Naval Research (Code 458) (2)
Chief of Naval Technical Training
Chief of Naval Technical Training (Code 016) (2)
Chief of Naval Air Training
Chief of Naval Education and Training Support
Chief of Naval Education and Training Support (01A)
Chief of Information (OI-2252)
Commandant of the Marine Corps (Code MP)
Commander in Chief, U. S. Pacific Fleet
Commander in Chief, U. S. Atlantic Fleet
Commander Third Fleet
Commander Naval Air Force, U. S. Pacific Fleet
Commander Naval Air Force, U. S. Atlantic Fleet
Commander Anti-Submarine Warfare Wing, U. S. Pacific Fleet
Commander Sea Based ASW Wings, Atlantic
Commander Training Command, U. S. Pacific Fleet
Commander Training Command, U. S. Atlantic Fleet
Commander Training Command, U. S. Atlantic Fleet (Code N3A)
Commander Operational Test and Evaluation Force
Deputy Commander, Operational Test and Evaluation Force, Pacific
Commander Naval Surface Force, U. S. Atlantic Fleet
Commander Naval Surface Force, U. S. Pacific Fleet
Commander Submarine Force, U. S. Atlantic Fleet
Commander Submarine Force, U. S. Pacific Fleet
Commander, Naval Air Systems Command
Commander, Naval Electronic Systems Command
Commander, Naval Facilities Engineering Command
Commander, Naval Sea Systems Command
Commander, Naval Supply Systems Command
Commander, Navy Recruiting Command (Code 00) (Code 20) (Code 30) (Code 50)
Commander, Naval Training Center, Bainbridge
Commander, Naval Training Center, Great Lakes
Commander, Naval Training Center, Orlando
Commander, Naval Training Center, Philadelphia
Commander, Naval Training Center, San Diego
Commander, Naval Electronics Laboratory Center

Commander, Naval Air Development Center
 Commander, David W. Taylor Naval Ship Research and Development Center
 Commander, Naval Surface Weapons Center, White Oak
 Commander, Naval Undersea Center
 Commander, Naval Weapons Center
 Commander, Naval Security Group Command
 Commander, Naval Ship Engineering Center
 Commanding Officer, Fleet Combat Direction Systems Training Center,
 Pacific (Code 00E)
 Commanding Officer, Naval Education and Training Program Development Center
 Commanding Officer, Service School Command, Great Lakes
 Commanding Officer, Service School Command, Orlando
 Commanding Officer, Service School Command, San Diego
 Commanding Officer, Fleet Training Center, San Diego
 Commanding Officer, Naval Training Equipment Center
 Commanding Officer, Naval Education and Training Support Center, Pacific
 Commanding Officer, Naval Health Research Center
 Commanding Officer, Naval Submarine Medical Center
 Commanding Officer, Naval Medical Research Institute
 Commanding Officer, Naval Aerospace Medical Institute (Library Code 12) (2)
 Commanding Officer, Naval Development and Training Center (Code 0120)
 Commanding Officer, Naval Damage Control Training Center
 Commanding Officer, Fleet Aviation Specialized Operational Training
 Group, Atlantic Fleet
 Commanding Officer, Naval Coastal Systems Laboratory
 Commanding Officer, Naval Underwater Systems Center
 Commanding Officer, Navy Manpower and Material Analysis Center, Atlantic
 Commanding Officer, Navy Manpower and Material Analysis Center, Pacific
 Officer in Charge, Naval Education and Training Information Systems
 Activity, Memphis Detachment
 Officer in Charge, Annapolis Laboratory, David W. Taylor Naval Ship
 Research and Development Center
 Officer in Charge, Dahlgren Laboratory, Naval Surface Weapons Center
 Officer in Charge, New London Laboratory, Naval Underwater Systems Center
 President, Naval War College (Code Ell4)
 Superintendent, Naval Academy
 Superintendent, Naval Postgraduate School
 Superintendent, U. S. Military Academy
 Superintendent, U. S. Coast Guard Academy
 Superintendent, Merchant Marine Academy
 Director, Naval Research Laboratory
 Director, Training Analysis and Evaluation Group (TAEG)
 Director, Navy Occupational Task Analysis Program Department, Naval
 Personnel Program Support Activity
 Director of Civilian Manpower Management
 Director, Department of Defense Computer Institute
 All Science Advisors and NSAP Representatives
 Human Goals Office, Newport
 Headquarters, Department of the Army, Office of the Deputy Chief of Staff
 for Personnel
 Army Research Institute for the Behavioral and Social Sciences
 Director, Army Human Engineering Laboratory

Human Resources Development Division, U. S. Army Personnel and Administration Combat Developments Activity
Personnel Research Division, Air Force Human Resources Laboratory (AFSC), Lackland Air Force Base
Occupational and Manpower Research Division, Air Force Human Resources Laboratory (AFSC), Lackland Air Force Base
Technical Library, Air Force Human Resources Laboratory (AFSC), Lackland Air Force Base
Technical Training Division, Air Force Human Resources Laboratory, Lowry Air Force Base
Flying Training Division, Air Force Human Resources Laboratory, Williams Air Force Base
Advanced Systems Division, Air force Human Resources Laboratory, Wright-Patterson Air Force Base
Program Manager, Life Sciences Directorate, Air Force Office of Scientific Research (AFSC)
Coast Guard Headquarters (G-P-1/62)
Commanding, Armed Forces Vocational Test Group
Assistant Secretary of Defense (Manpower and Reserve Affairs)
Director of Defense Research and Engineering
Defense Race Relations Institute
Defense Activity for Non-Traditional Education Support
Center for Naval Analyses
National Research Council
National Science Foundation
Science and Technology Division, Library of Congress
Secretary Treasurer, U. S. Naval Institute
Defense Documentation Center (12)